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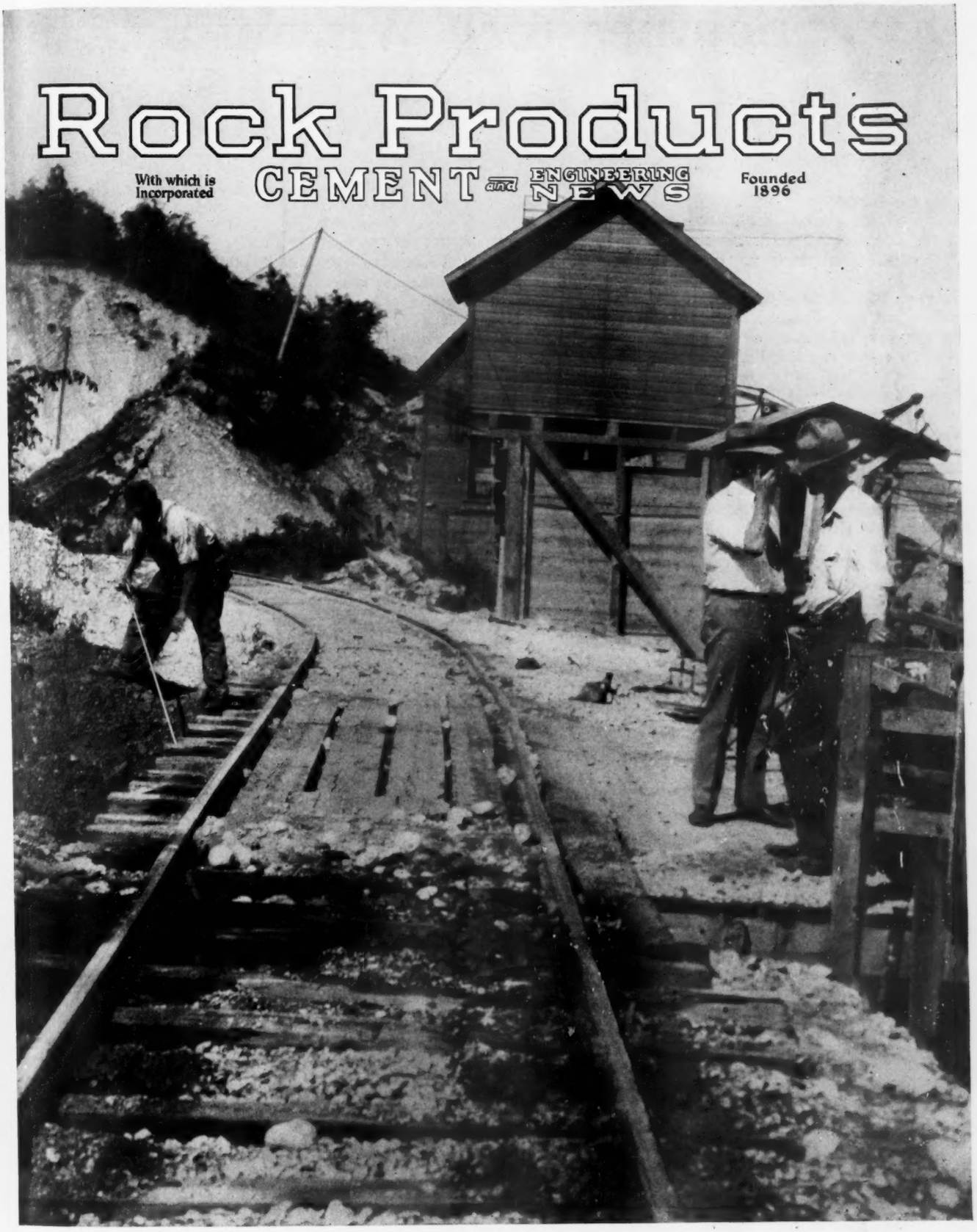


Wisconsin Sand and Gravel Co., North Lake, Wis.

Mineral Aggregate Industry of Southeastern Wisconsin

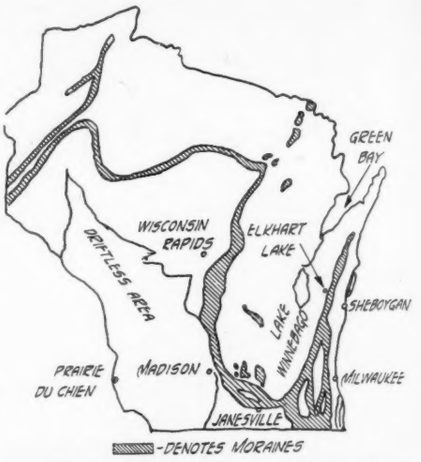
By Edmund Shaw
Editor, Rock Products

THE southeastern part of Wisconsin (roughly, the portion east of a line drawn from Green Bay through Madison) is a fat and prosperous land, known the world over for its fine herds and great dairy business. It is also a great manufacturing district, making almost everything that is made anywhere in factories, heavy machinery, automobiles and parts, shoes, textiles, plumbing fixtures, paper and woodenware being only a few of the items in a long list. Milwaukee, the chief city, is a town of half a million, but more people live in towns of 5,000 to 60,000 population and the fine farm houses. For in this part of the country one may see clean and thrifty manufacturing towns accompanied by a prosperous and progressive countryside to a greater degree than in any manufacturing section of the country that the writer has visited.

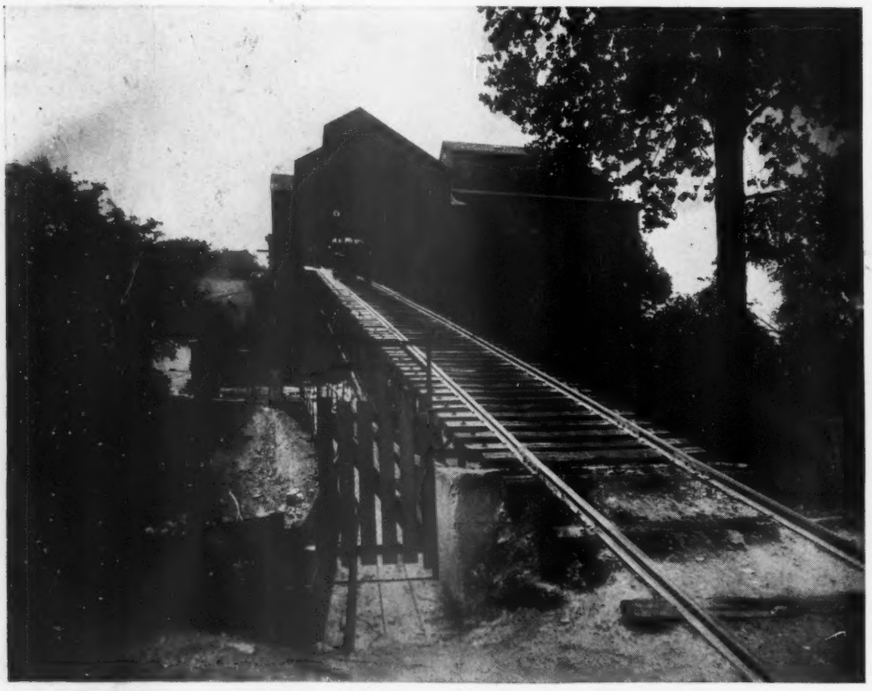
Naturally, such a busy section does a great deal of building, and this means the support of a large and thriving mineral aggregate industry. There are 62 plants in the state producing sand and gravel and crushed stone, and 44 of them are in this area. Their production is perhaps 5,500,000 tons of the 6,200,000 tons the state produces* per annum. Of this perhaps 900,000 tons goes to the building of highways, and the remainder goes into general building and street paving. The material comes in part from the limestone ledges which underlie this area, but the greater tonnage comes from the glacial sands and gravels with which this area is covered.

Rarely does one find an area in which there is so much good aggregate material. It is practically surrounded and also cut through by the moraines of the late Wisconsin glaciation, shown on the accompanying map. A great deal of it is left in the forms called kames and eskers into which it was formed by the water from melting ice. As the material was not moved far, in these deposits there is an unusual quantity of coarse gravel and boulders, so that some of the gravel plants produce more crushed than uncrushed material. Farther away from the moraines, sand is more abundant. It is estimated that the deposits worked in this area will average 50% gravel and 50% sand, but the variation in the operations visited in a recent editorial trip were from 35% gravel to 82% gravel of the whole deposit.

The trip was taken through the courtesy of the Wisconsin Mineral Aggregate Association and its secretary, Gordon F. Daggett, who drove the writer some 700 miles and picked out the plants to be visited. The



Moraines of the late Wisconsin glaciation showing why the state has such fine gravel deposits



The plant of the North Shore Material Co. at Racine as viewed from the quarry rim

association deserves more than a passing word, for it is perhaps the greatest factor in the development of a stable aggregate industry in the state. Years ago the two main branches of the industry, crushed stone and sand and gravel, found that they had more in common than in opposition and they decided to unite and build up the aggregate industry as whole rather than to continue as warring factions. The result has been what is perhaps the most successful local association in the country.

Competition is keen and costs have to be kept low, because prices are necessarily low. The abundance of material makes it possible to open a new pit almost anywhere, so that outside competition would come up overnight if prices became unreasonably high. There is a great deal of it as it is, and the most difficult problem of the association has been to meet the competition of dirty and otherwise unfit material that comes from "local pits." But a steady campaign of publicity and education has been carried on, aided of late by newspaper advertising, so that even the public, which ordinarily knows nothing

*This refers only to cleaned and screened material, the product of recognized commercial plants. The figures are given by the Wisconsin Mineral Aggregate Association.

The incline for the quarry cars passes over the Root river at the North Shore Material Co. plant

The large storage piles at the Racine plant of the North Shore Material Co. with the crusher building at the left

of such matters, is beginning to understand that "cleaned and screened material," as the association's slogan puts it, not only makes better and stronger concrete but is more economical to use because it saves cement.

Mr. Daggett, the present secretary of the association, is unusually fitted for his work, as he was materials engineer for the highway department for some years. He is a graduate engineer and has done an unusual amount of work in sand and gravel production, winning his master's degree from the University of Wisconsin by a thesis on this subject. Besides his secretarial work he acts in a consulting capacity for the members of the association, and by bringing a fresh as well as a trained mind to the problems of an operation he is able to be of great benefit to its conduct. He has built, designed and operated plants, so he knows the business thoroughly from both ends.

Naturally, all the 44 plants of the area could not be visited. Those that were visited were selected in the first place because they were on the route that had been laid out, and, in the second place, because they were typical of the plants of the area. And

A bar grizzly sends large pieces to the crusher above the scalping screen at the Peters plant

because it was convenient, the trip began at Racine and the first operation visited was that of the North Shore Material Co., a short distance from the city.

North Shore Material Co.

This is a crushed stone plant and notable because it is the only stone plant in the state producing a washed product. The output is about 2000 tons daily. It has an unusual layout, as the quarry is on one side of the Root river and the plant on the other, connection being over a steel bridge on a 12 deg. incline. It is an old quarry which has been worked to a depth of 50 ft. and is now being worked with a second face of 35 ft., which is being deepened to 50 ft. The rock is the Niagara dolomite, and while the quarry floor is below the river, there is little or no seepage to contend with and no pumping has to be done except in times of heavy rain.

Four Sanderson-Cyclone well drills put down holes 12 ft. apart with 16-ft. burden, carried 3 ft. below the quarry floor. All the charge is placed in the lower part of the hole. Loading is by two Bucyrus steam shovels, one of 100 tons and one of 78 tons, both with caterpillar treads. There is also a 20-ton Erie shovel on tractor wheels employed as an auxiliary.

The drag-scraper method which was formerly used in the pit of the Peters Sand and Gravel Co. at Burlington

New belt conveyor under construction at the Peters plant, which will supplant the use of a dragline

General view of the pit at plant No. 4 of the Janesville Sand and Gravel Co., showing the two movable conveyors, and the crane loading at the far end

The crusher house at the Janesville plant, with the conveyors leaving the screening and washing plant at the right

Koppel 5-yd., end-dump cars, all steel, are employed and they are brought to the foot of the incline by steam dinkies, two 14-ton Vulcans and an 18-ton Davenport. They are pulled up the incline, which is 16 deg. from the quarry floor to the bridge and 12 deg. from there on, by a Lidgerwood hoist. The primary crusher is a No. 12 Gates, and the material goes from this to a 48-in. by 20-ft. scalping screen, where the minus 2-in. material is taken out and sent to the washing plant. The oversize goes to a No. 7½ Allis-Chalmers crusher and from this to a 48-in. by 16-ft. screen, and the rejects from this go to two No. 5 Gates crushers. Allis-Chalmers rolls are used for recrushing.

Washing is done in one of a pair of sizing screens, the other being usually run dry. A feature of the washing practice, that might sometimes be followed elsewhere, is to take out the screenings before adding the water, reducing the amount of washing that has to be done very greatly. For sizing there are two 40-in. by 12-ft. screens, two vibrators made at the plant, and two 40-in. by 22-ft. screens. The setting of these is unique, as they run from the center to the corners of the building so as to gain the necessary space. A number of sized products is made, running from an 8-in. kiln stone (taken out at the scalping screen) through the usual commercial sizes to screenings for which there is a steady demand. About 100,000 tons of sized products can be carried in storage, and a Browning crane with a 1½-yd. bucket handles the stored material.

This plant is noted throughout the industry for its steady running, as it loses only four hours per month, on an average, a record that speaks well for the organization as well as the plant design. It is an old plant (the quarry was originally opened in 1909) but it has been kept up to date and was quite recently remodeled throughout. "Rolman" manganese steel bar screens have been used on the coarse screens for some time and have considerably added to the steadiness of operation.

The president of the company is Ed H. Taylor and Otto A. Cheska is vice-president and general manager. H. P. Minier is secretary-treasurer. The company also operates a gravel plant at Libertyville, Ill.

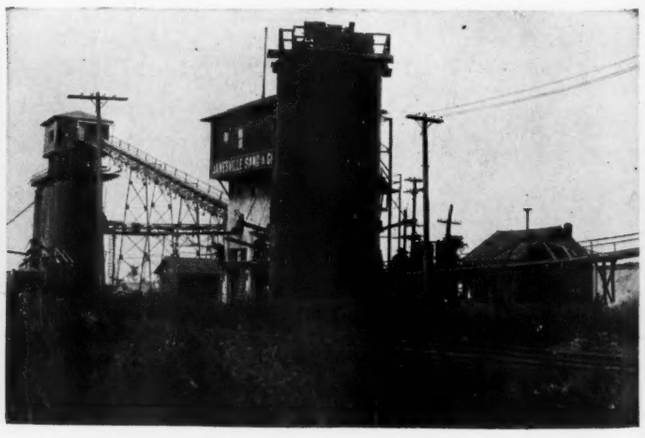
Peters Sand and Gravel Co.

The Peters Sand and Gravel Co., at Burlington, which was the next visited, is a comparatively small plant (25 to 30 cars per 10-hr. day) but it is one of the best plants of that tonnage to be found in the state. It is owned and managed by John W. Peters, who also conducts a trucking business and a flourishing concrete products plant. A. J. Stock is superintendent of the gravel plant.

The deposit has been worked until recently by a Sauerman 1½-yd. scraper bucket and Thomas hoist, but changes in the bank made another method of operation necessary and a Koehring convertible gas shovel will now be used. This will load on to a 24-in. belt that will bring the material to the hopper formerly filled by the scraper. This belt was being installed when the plant was visited.

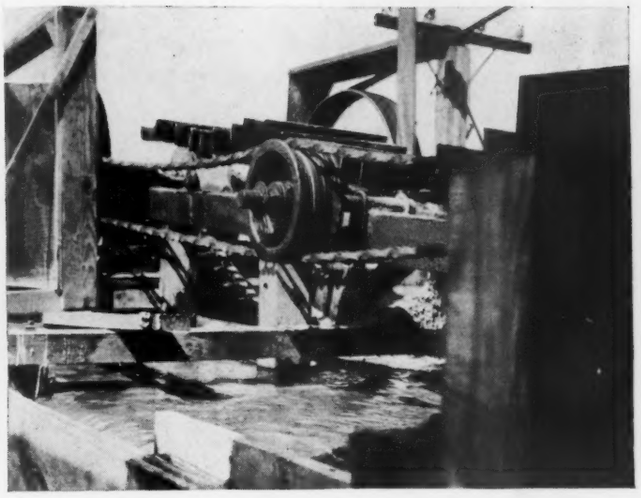
From the hopper the material goes through a Smith feeder to a 24-in. belt, about 200-ft. centers, that delivers to a 2-in. grizzly. The oversize goes to a No. 5 McCully crusher and a 48-in. by 12-ft. scalper. The oversize goes by gravity to an Allis-Chalmers reduction crusher and then by a shorter belt to join the undersize of the grizzly on the belt to the washing plant. In this there are two 42-in. by 8-ft. conical screens with 1¼-in. openings; two 60 in. by 8 ft., but with ⅝-in. and ½-in. openings, and two sand screens with 72-in. by 8-ft., with ¼-in.

The pit of the Janesville plant, showing the movable conveyor from the pit emptying to the stationary conveyor to the scalping screen



Plant No. 4 of the Janesville Sand and Gravel Co., showing unusual separation of the sand and gravel plant units

The washing plant of the Janesville Sand and Gravel Co. operation at Janesville, Wis.



One of the sand drags at the Janesville plant. There are two of these flight conveyor sand drags in series at the plant

openings. The sand is recovered and dewatered in three Toepfer and Sons double screw washers, and the mason's sand is removed from part of it by a "Hum-mer" screen. For water supply there are two Allis-Chalmers high-duty centrifugal pumps, 4x5 in. in size. One of these pumps from a well 98 ft. deep, the other from a pond near the plant.

Although Mr. Peters runs a very successful general trucking business, most of the sand and gravel he produces is shipped by rail. The plant is on both the Milwaukee and the "Soo" lines.

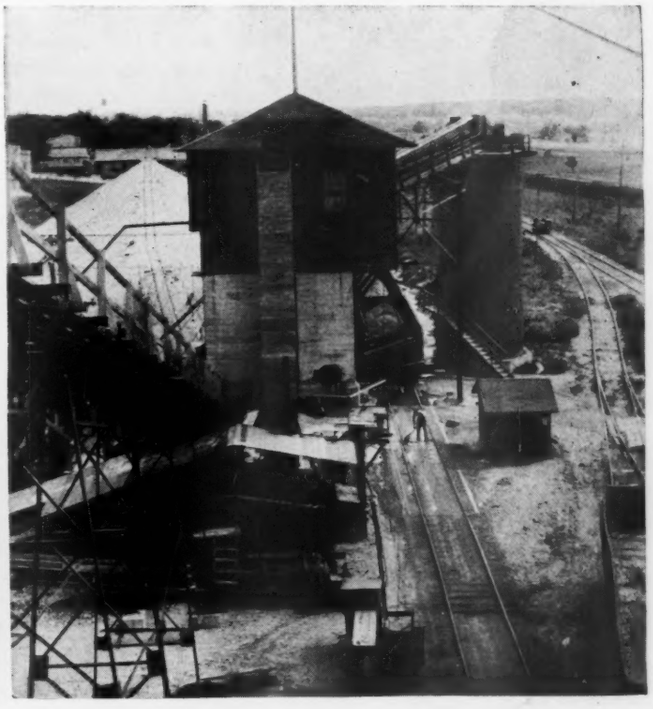
Janesville Sand and Gravel Co.

The Janesville Sand and Gravel Co. has four plants at Janesville and it is the largest producer in the state, shipping over 100 cars daily in the busy season. It maintains large retail yards in Milwaukee and has a fleet of Mack trucks and it is just installing two Barrymore trucks with mixer bodies for furnishing ready-mixed concrete.

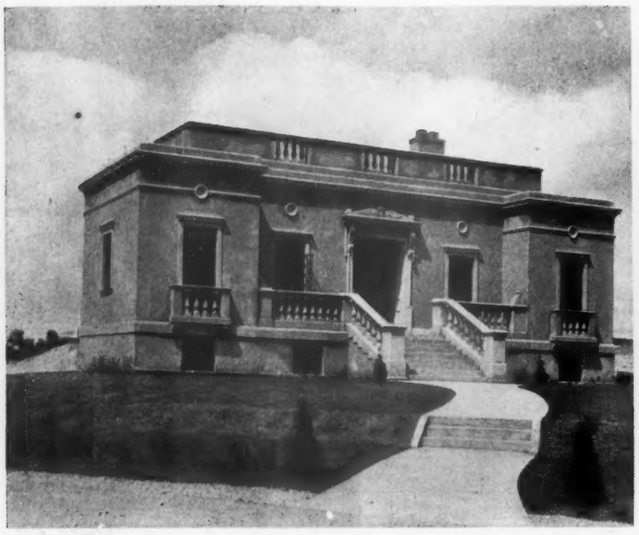
The deposits worked are very large and deep and the proportion of sand is higher than in some of the other operations visited. The face worked at present is 90 ft. high and there are 6 ft. to 7 ft. of stripping to be removed. This is taken off by a Link-Belt dragline with a ¾-yd. bucket. Cars drawn by horses take the dirt away and have been found cheaper than trucks for this work.

The No. 4 plant is the newest, as it is the largest, of the plants, although operations are going on for building a new plant to take the place of No. 2. No. 3, which is farther along on the same railroad, is in some respects a duplicate of the No. 4 plant, so only the No. 4 plant will be described. This is a very well built plant, steel and concrete being used for the main construction. The bins, of the silo type, are of steel. The No.1 plant

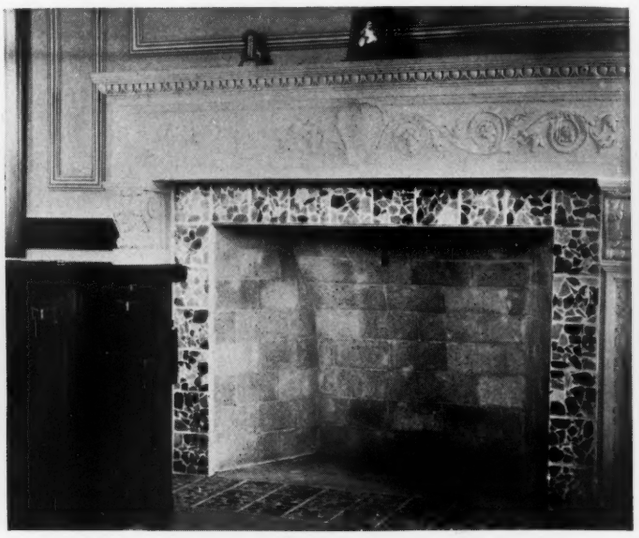
The conveyor at the left discharges to bins over the two reduction crushers in the crusher house at the Janesville plant



Another view of the washing plant at the Janesville plant, showing the overhanging construction of the bins above the railroad track



New office building of the Janesville company, in which as much as possible of the company's product was used



The fireplace in the office of J. K. Jensen, president of the Janesville company, showing broken pebble facing

The material for storage is taken to the piles on these tracks at the Janesville plant

produces principally mason's sand.

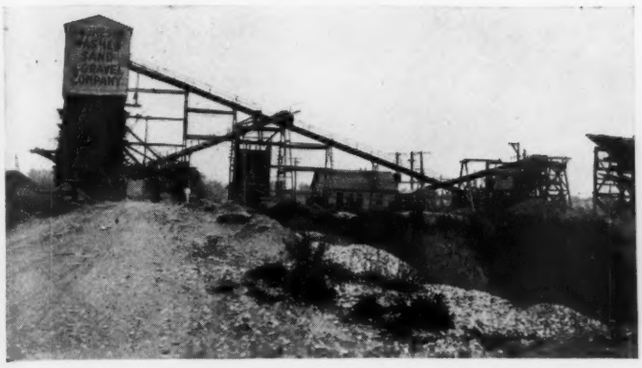
As the bank is so largely of sand and contains few large pebbles, a locomotive crane has been found superior to a steam shovel for loading the bank material which is caved down before it. All this caving is done by men. The stripping, after being removed by an industrial railway, is removed from the dump and washed back into the pit by hydraulic methods.

The crane puts the bank material in a hopper over a 24-in. belt of 800-ft. centers altogether, that connects the bottom of the pit with the plant. This is in three sections, the two sections nearer the crane being moved as necessary to accommodate the work. The third section connects these with the scalping screen which is on the track level near the main washing plant. It is a conical screen 6 ft. by 48 in., and its oversize goes by a 24-in. belt to bins above the two No. 2 McCully crushers, which are in a house on a lower level near the belt from the pit. The discharge from these crushers goes on to this belt by gravity and is taken

Vibrating screen operating under a stream of water to remove pea gravel at the No. 4 plant of the Janesville Sand and Gravel Co.

The pit of the Okauchee plant of the Waukesha Sand and Gravel Co., showing the shovel at the far end loading to the long belt conveyor

At the Okauchee plant a steam shovel is used for loading down to water level, and a cableway excavator is employed in the pit when it is below water level



A general view of the Okauchee plant of the Waukesha Sand and Gravel Co.

The Okauchee plant, showing the conveyor bringing the material from the pit to the plant

back to the scalping screen.

The undersize of this scalping screen goes by a bucket and belt elevator to the washing plant, the first operation being dry, however. This is the removal of the sand and pea gravel, and it is done by screens, designed and built at the plant, of a special kind. One advantage of this dry screening is that it may be done in winter as well as summer, for the bank is dry and the material is clean enough to meet ordinary specifications without washing. But as so many specifications call for washed sand, it has to be washed anyway, and dry screening has been omitted in later plants.

The separated sand goes by a 24-in. belt to the sand-washing plant, where the pea gravel or roofing gravel from ⅜-in. to ¼-in. is taken out on a Link-Belt vibrating screen run with sprays. The undersize of this screen then goes (with water) to two flight conveyor sand drags in series. The product of the first is concrete sand and of the second mason's sand, made from the overflow of the first box. These sand drags have single chains, which is unusual with so large a capacity. The roofing gravel and sand fall into three steel silos.

The gravel which is the oversize of the dry screens is washed and separated into the usual sizes, the size known as "No. 6" being sent by a belt to a steel silo. The other sizes fall into concrete bins below.

This is in many respects a noteworthy plant aside from its large production. Many of its units were designed and built on the ground especially for the work they have to do, and they have been very successful in operation. At present the feature that attracts everyone's attention is the beautiful office building recently erected. It is of concrete, and J. K. Jensen, the president and manager of the company, saw to it that as much material as possible should come from the pit and that it should all be of local materials. The terrazzo floors are of pea gravel and colored stones which were picked out of the gravel have been broken and set in tiles to make an ornamental fireplace in his private office. The interior is beautifully decorated and furnished.

J. R. Jensen, brother of the president, is in charge of production.

Waukesha Washed Sand and Gravel Co.

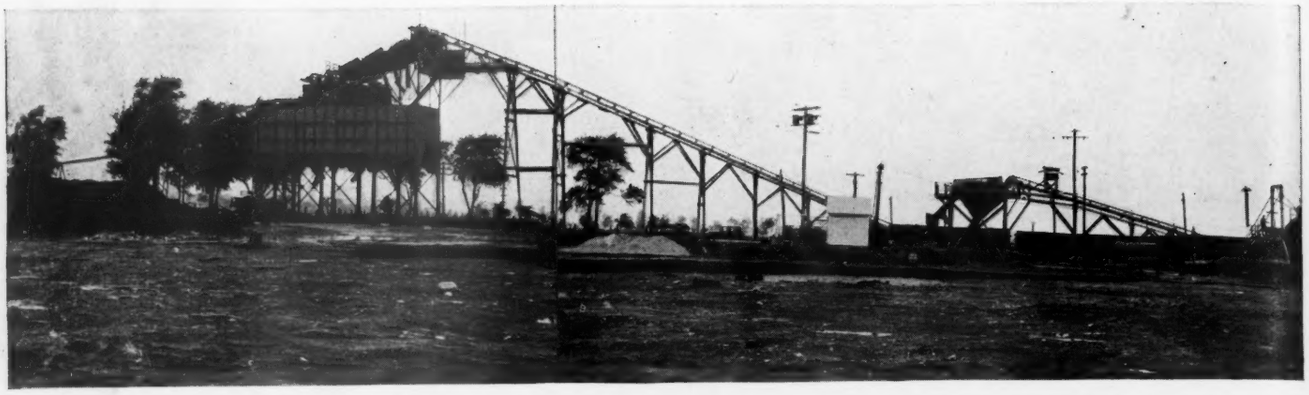
Two of the plants of the Waukesha Washed Sand and Gravel Co. were visited, the plant at Okauchee and the plant at Waukesha. The Okauchee plant is considered by Mr. Daggett to be the typical plant of the Wisconsin glaciated area, embodying most of the features that are to be found in the principal plants of the district.

The drag-scraper making the opening cut at the Waukesha plant

The pit at the new Waukesha plant of the Waukesha Sand and Gravel Co. has been opened by two drag-scrapers working at right angles to each other

The system of working the bank, however, is decidely unique, as it employs a steam shovel and a cableway, dragline excavator in series. The shovel digs the bank approximately to water level and the cableway digs below water. Both use a conveying belt system to get the material to the plant.

The shovel is a "Type O" Thew with a ¾-yd. bucket. It works at the end of a conveyor which is advanced by adding a section to the conveyor support and lengthening the



The new Waukesha plant of the Waukesha Sand and Gravel Co., which was only recently completed and placed in operation

belt. When a cut is completed through to the end of the property the belt is dismantled and started back close to the hopper where it joins the main belt to the plant. This system is considered better than having a belt run the length of the bank from the first, to be skidded over when the shovel

Scraper excavator anchorage at the Waukesha company's new plant

has cut the full length, as it enables the shovel to make a wider cut.

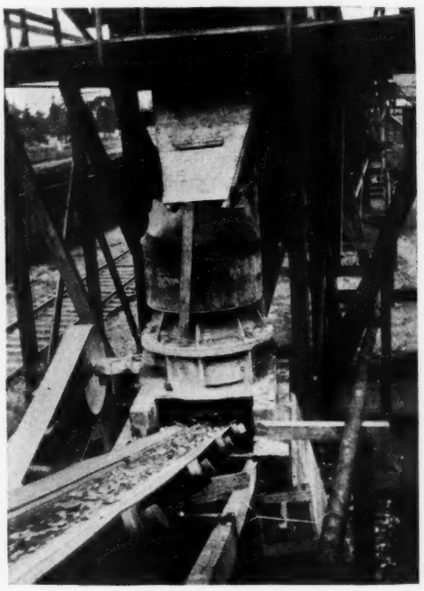
The Sauerman cableway excavator has a 1½-yd. bucket and discharges on a storage pile where the material is drained before being placed on the conveyor that takes it from the pit. The method of draining and conveying will be found in the "Hints and Helps" section of a later issue. A 150-hp. Thomas hoist with a double drum pulls in the bucket.

With the two-belt system about 2000 ft. of conveyors are used, but the method has been found by a careful comparative study to be the cheapest way to get the material to the plant. Link-Belt and Dodge idlers and drives are employed.

At the plant the material goes first to a scalping screen. The oversize falls into a No. 5 Telsmith crusher and then by gravity to the main plant belt. This elevates to Toepfer screens on the bins with 1½-in., ½-in., and ⅜-in. perforations. The oversize falls to a size 1, Type D, Gates crusher and is returned by a belt (in reverse direction) to the main plant belt. The other products go to bins, except the sand, which is settled in two Telsmith automatic tanks in series, making two grades of sand.

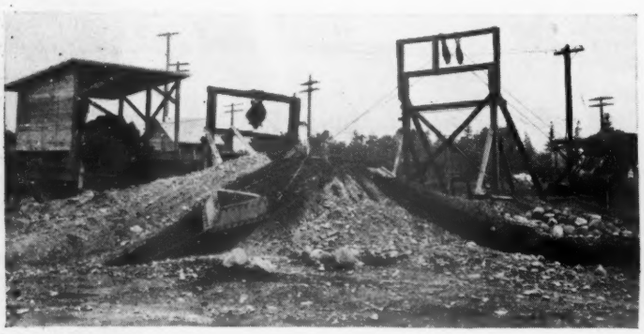
The Waukesha plant of this company was built this spring and had only been in service a short time when it was visited. A full description of it will be given in a separate article, as it contains some features that should be described more fully than is possible here. One of its main features is a new type of steel bin designed for this plant with the special purpose of supplying dry material to go to a storage belt.

At present the ground, which has been stripped by contract, is being opened in an unusual way by using two scraper buckets which make cuts at right angles. One of the advantages of the method is that it works out a square pit instead of the more usual fan-shaped pit.

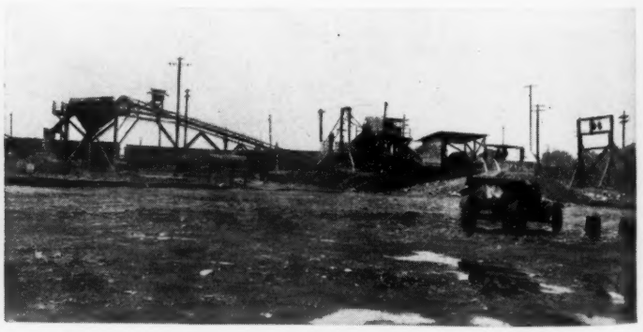


Crusher installation at the Waukesha plant of the Waukesha Sand and Gravel Co.

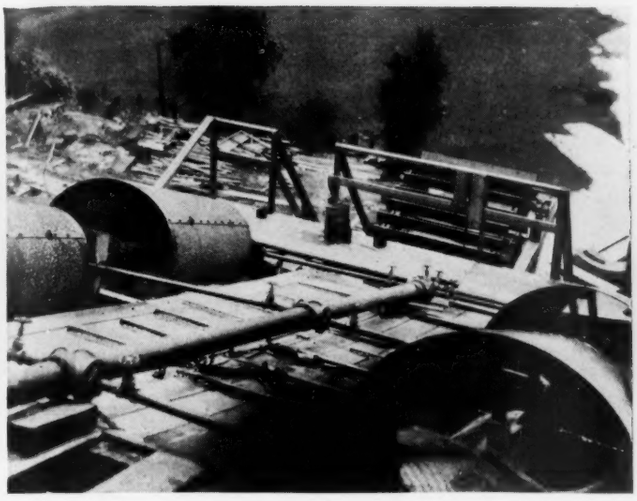
This plant is among the best in the state and perhaps embodies as late ideas of Wis-



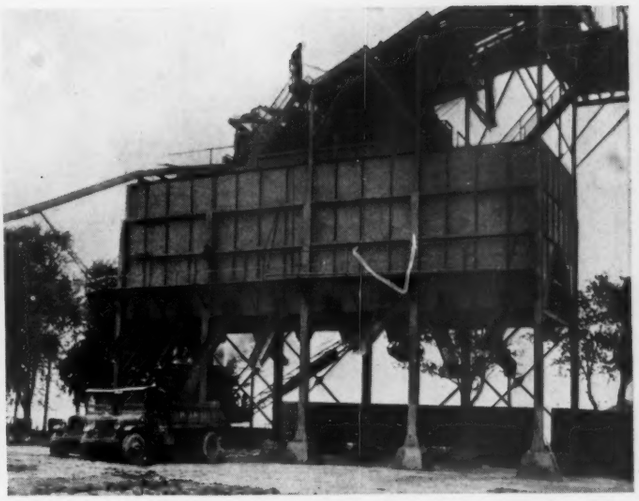
The hopper at the apex of the two right-angled scraper cuts into which each scraper dumps its material at the Waukesha plant of the Waukesha Sand and Gravel Co.



Material is brought by scraper to the hopper at the right, at the Waukesha plant, and is carried by belt conveyor to screen and crusher on the left



Washing screens at the new Waukesha plant, with the sand drag beyond



Bin arrangement of the Waukesha company's new plant facilitates loading cars and trucks

consin practice as any in the field. George Brew is president and manager of the company. The Okauchee plant is in charge of Ed Reiton and the Waukesha plant, of Wm. Buttke.

Waukesha Lime and Stone Co.

The Waukesha Lime and Stone Co. plays no favorites in aggregates, for it produces crushed stone in a plant on one side of the road and gravel in a plant of the other side. But the gravel plant might almost be called a crushed stone plant, as so many large boulders are crushed in it.

The gravel bank runs 82% gravel, according to records of last year's output. The face worked is 90 ft. high and it is dug with a full-revolving No. 80-B Bucyrus shovel, steam-driven. This loads into 7-yd. Continental cars which are drawn in by 17-ton Milwaukee gasoline locomotives. Three trains are in service so that while one is loading at the shovel another is at the hopper and a third is on the road between the two.

At the hopper the cars dump to an apron type feeder 72 in. wide and 14 ft. long, built at the plant. This feeds everything to a No. 12, style K, Allis-Chalmers crusher, from which it goes to a 36-in. elevator 41 ft. high that lifts to a 72-in. by 12-ft. scalping screen. The oversize goes to two Newhouse suspended crushers, which were among the first built of that type, and to two No. 6 style K crushers. All the crushers are set so that no rejections would be made if the crusher discharges were sent back to the screen.

From the crusher the material is elevated by another 36-in. elevator of 75-ft. centers to three O'Laughlin screens, made in Milwaukee. These size the material into four products from 2-in. down. The sand is at present caught in four Dull cones, but boxes with flight conveyors are now being installed in order to produce dryer sand.

The output of this plant is 3000 to 3800 tons per day, of which 60% is crushed material.

Water is supplied from three pumps, a No. 8, a No. 6 and a No. 4, all of Allis-

Steel bins with chutes at one side for cars and the other side for trucks are used at the new Waukesha plant

Looking down on the screening and crushing plant of the new Waukesha plant of Waukesha Sand and Gravel Co.

The plant of the Waukesha Lime and Stone Co. at Waukesha, Wis.

The gravel bank at the plant of the Waukesha Sand and Gravel Co., which contains more than 80% gravel

Chalmers make. Together they supply 4820 g.p.m.

An unusual feature to find in a gravel plant is a National Brake and Electric Co. air compressor of 345 cu. ft. capacity. This is connected with 6000 ft. of pipe, so that air for tools and other purposes may be available in either plant. Another unique feature recently installed is the car-pulling system designed by Fred Wolf, the vice-president and general superintendent of the company, which will be described in the "Hints and Helps" section a little later.

For storage there is a Koehring No. 301 crane and a 20-B Bucyrus convertible. The track facilities at this plant are unusually good, as they will hold 92 loaded cars and 74 empties.

Quarry and Crushing Plant

The limestone quarry across the road from the gravel plant is in the Niagara dolomite, as are all the crushed stone plants of this part of the state. The plant produces about 1000 tons daily. Sanderson-Cyclone drills put down the holes and a 50-B Bucyrus shovel loads the broken rock into 4-yd. "Western" side-dump cars. Holes are spaced 20 ft. apart with 18- to 20-ft. burden. They are staggered and two rows of holes are shot at once. All the load is placed in the bottom, but with this system little secondary shooting is needed. The face is 36 ft. high.

The cars are brought in by an 8-ton Milwaukee locomotive and dumped to a 40x60-in. Allis-Chalmers jaw crusher. From this the material passes to a 42-in. steel pan conveyor which raises it 75 ft. to a 60-in. by 12-ft. scalping screen. The oversize goes to a No. 7½-in. crusher and all material is sized in O'Laughlin screens. A Symons cone crusher is used for recrushing.

A large part of the product of this plant is dried and pulverized. This part of the process was described in detail in the August 23, 1923, issue of Rock Products, the reason being that a steel belt, 350-ft. centers, had just been installed to convey material to the dryer. This belt is still in operation and Mr. Wolf says it has given thoroughly satisfactory results.

The dryer is 60 in. by 65 ft. and the material passing it goes to a Dings magnetic pulley and then to two Allis-Chalmers pulverators in closed circuit with two "Hummer" screens which take out 10-mesh and finer agstone and three grades of terrazzo stone.

In the summer months the agstone is sent to a 60-in. by 22-ft. Smidth tube mill, where it is ground to 200-mesh material, largely used as asphalt filler. This is sacked by a Bates 4-valve packer. A warehouse 35x140 ft. is used for storing the various ground products.

A considerable portion of the plants' product is sent to an Amesite plant operated by a paving contractor which stands near by.

H. M. Halversen is president of the company, Fred Wolf is vice-president in charge of production, E. F. Bremer is secretary-treasurer, and N. K. Wilson is vice-president in charge of sales. Mr. Wilson was formerly secretary of the Wisconsin Mineral Aggregate Association. Mr. Wolf is known throughout the Wisconsin industry as a "wizard" in getting production from plants. Both plants are exceptionally well

A full-revolving steam-driven shovel removes the gravel in the pit at the Waukesha Lime & Stone Co. plant

At the Waukesha Lime and Stone Co. loading of gravel is to side-dump cars pulled by gasoline locomotives

Quarry and shovel of Waukesha Lime and Stone Co., where stone is produced just across the road from the gravel plant

Crushing plant of the Waukesha Lime and Stone Co. at Waukesha, Wis.

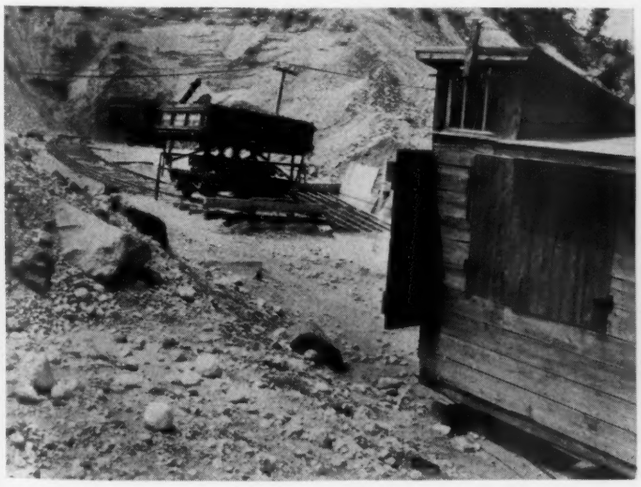
kept, for Mr. Wolf is a firm believer in "good housekeeping."

Moraine Gravel Co.

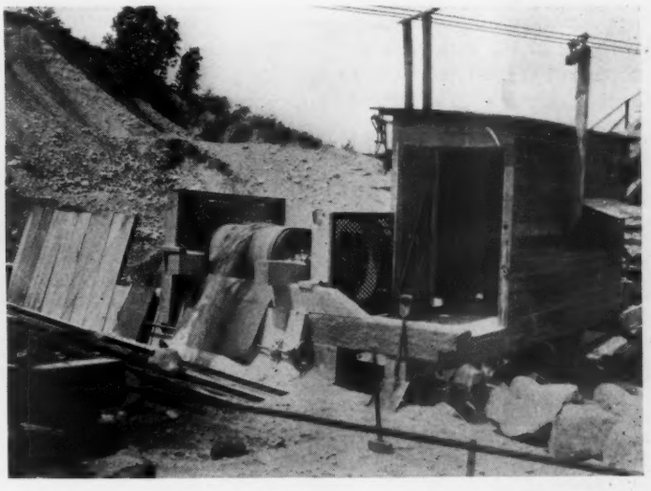
The operation of the Moraine Gravel Co., which is owned by Dr. C. R. Nutt and Mrs. A. W. Lee, was of peculiar interest on this trip, as it was designed by Mr. Daggett and had only recently gone into production. As a detailed description will be published later, only the main points will be touched upon here.

The location is about four miles out of Plymouth at Glenbeulah, and it is in, or close to, the principal moraine on the eastern side of the glaciated area. For this reason the deposit consists of typical kames and kettle holes, and the gravel is fairly coarse. The plant has two crushers, a No. 6 Telsmith and a No. 4 Telsmith, both driven by the same motor along with the scalping screen and belt. This arrangement has been found to save considerable power, and it makes a less expensive installation.

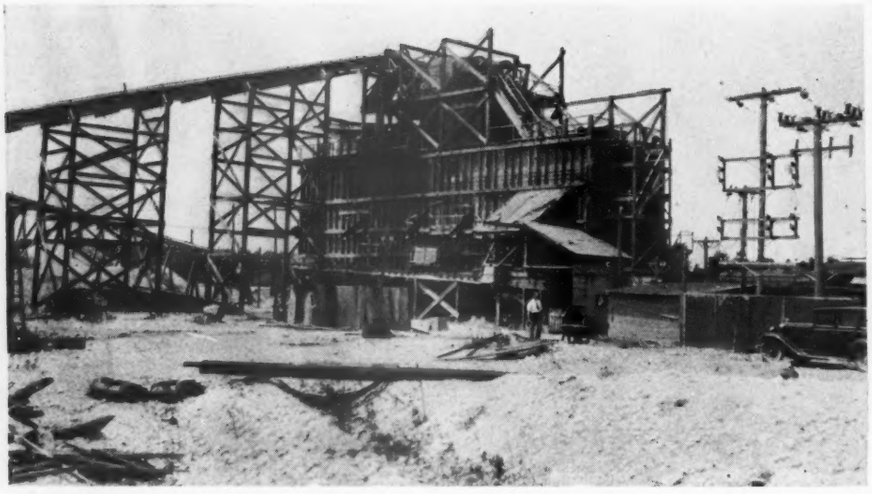
The new plant of the Moraine Sand and Gravel Co. at Glenbulah, Wis.



The cars from the pit at the Elkhart Lake Sand and Gravel Co. are pulled by a hoist to the plant, over tracks which are movable



The bar grizzly on which the cars dump, and to which crushed material is returned, at the Elkhart Lake plant



Plant of the Elkhart Lake Sand and Gravel Co. at Elkhart Lake, Wis.

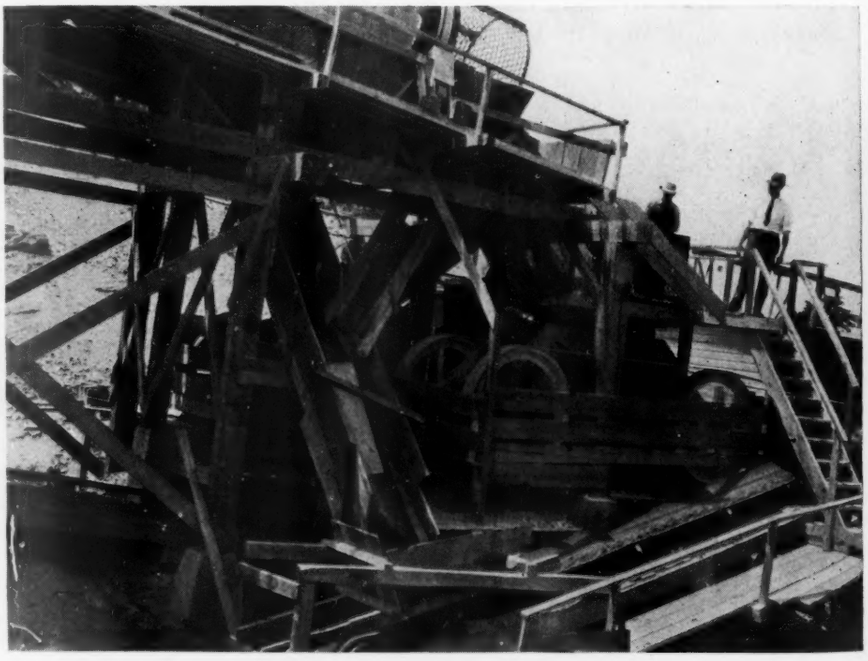
A No. 1 Thew electric shovel is used to dig the bank, and the company has a No. 2 shovel of the same make, but steam-driven, which will be put in service when the shovels have to work further from the plant. At present the ground is being "cleaned up" by taking out hills that lie between it and the main deposit. In this there is a pit that supplied an older plant. When the present ground is worked out the deposit will be opened with a long face ready for a large production.

Elkhart Lake Sand and Gravel Co.

A stop of a few minutes was made at the plant of the Elkhart Sand and Gravel Co. at Elkhart Lake to see a novel crusher which was installed there about a year ago. This is the three-jaw crusher made by the Bakstad Machinery Co. of Elkhart, Ind., and it was described in detail in the "New Machinery" section of Rock Products for August 6, 1927. The primary breaker portion of this machine feeds into a pair of smaller jaw crushers below, which do the secondary crushing, and since the chances are very remote that all three jaws would encounter a hard piece at the same time, the power required is less than it would be for three separate crushers. The crusher has been running steadily since it was installed, and the man in charge said its work had been quite satisfactory up to the present time.

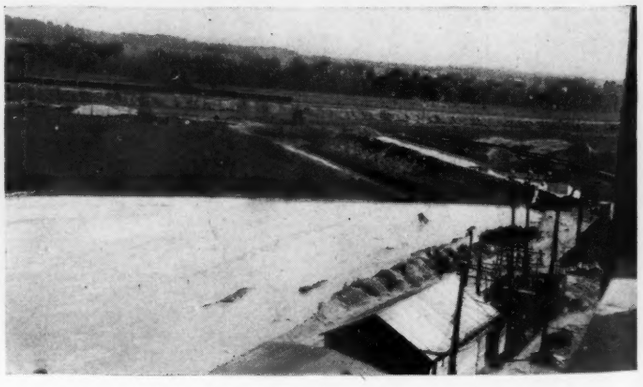
The plant in other ways is an excellent one and it was unfortunate that time did not permit a detailed study. The method of bringing the material from the bank to the plant is unusual. The cars are pulled in by a hoist over a track that is extended or swung around as the shovel works farther into the bank. The cars discharge over a track grizzly and the belt from the crusher that returns the crusher discharge to the scalping screen discharges on this grizzly. The arrangement has the advantage of keeping this belt flat.

The country about Elkhart Lake is in the moraine and the landscape is a succession of gravel hills, kames and eskers. But on the edge of these are what appear to be dune formations (the district is not far from the shore of Lake Michigan) and these have been worked in the past for silica sand. Two or three of these pits which appeared to have been abandoned for some time were noticed by the roadside.

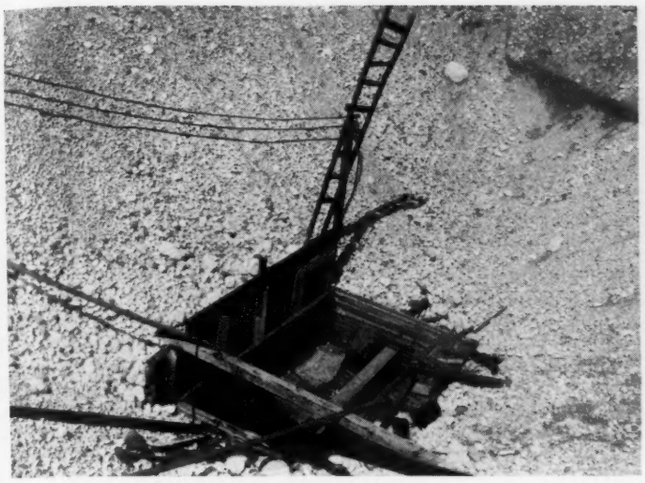


The novel triple-jaw crusher at the Elkhart Lake plant

The bank of the Wisconsin Sand and Gravel Co. at North Lake, which has been increased to 125 ft. in height



Settling pond and waste flume deposit at Wisconsin Sand and Gravel Co. operation



Pump with 6-in. line sunk in the bottom of the pit at the North Lake plant

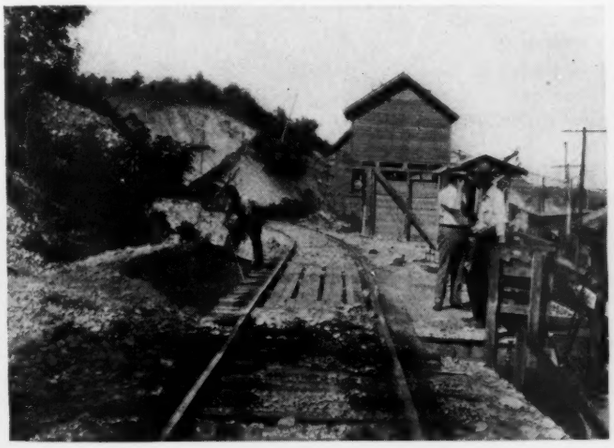
Loading is done to side-dump cars with a steam shovel at the Wisconsin Sand and Gravel Co. plant

L. L. Laun is president of the Elkhart Sand and Gravel Co.

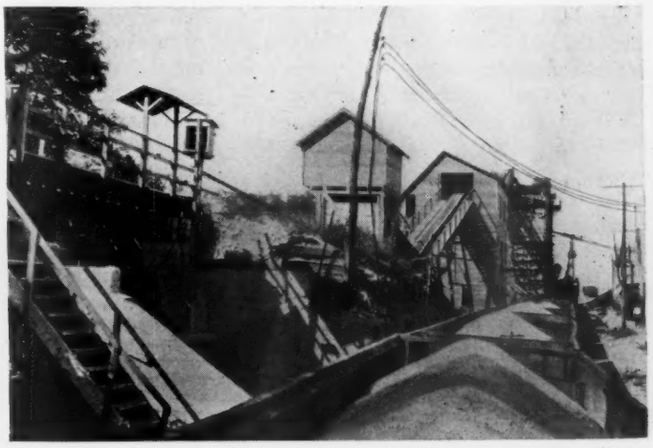
Wisconsin Sand and Gravel Co.

The operation of the Wisconsin Sand and Gravel Co., the last sand and gravel plant visited on this trip, is one of the larger producers in the state and one of the best from an engineering point of view. This would naturally be the case, as everyone connected with the work of production has an engineer's education.

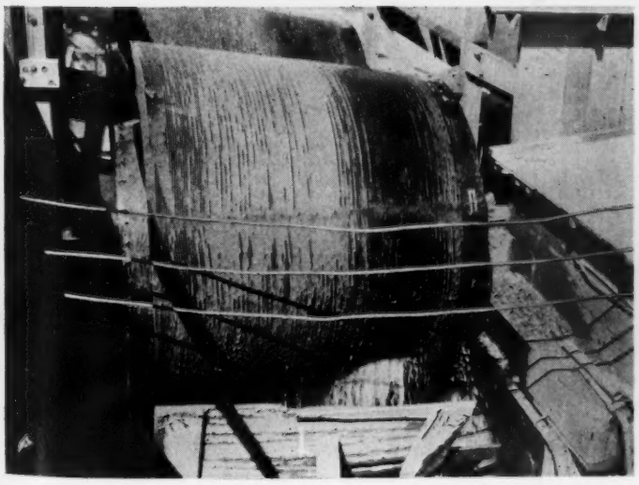
The bank is 125 ft. high. It was originally 100 ft., but has been deepened 25 ft. and will be deepened still more, as drilling



The cars dump to a track hopper over the primary crusher at North Lake



Crusher at the left immediately below the track hoppers at the North Lake operation



Special triple-shell conical screens at the North Lake plant, in which the middle screen is reversed

Regular cylindrical screen at the North Lake plant of the Wisconsin Sand and Gravel Co.

Stock piling at the North Lake plant is done along railroad tracks, the material being handled by a locomotive crane

has shown that there is a considerable depth of gravel between the present pit floor and water level. The track is laid so that no more than a 3% grade resulted from deepening the old pit, so the same equipment, Western 16-yd. standard gage cars and a 20-ton Davenport steam locomotive, are used to pull in the material. The shovel is a 50-B Bucyrus.

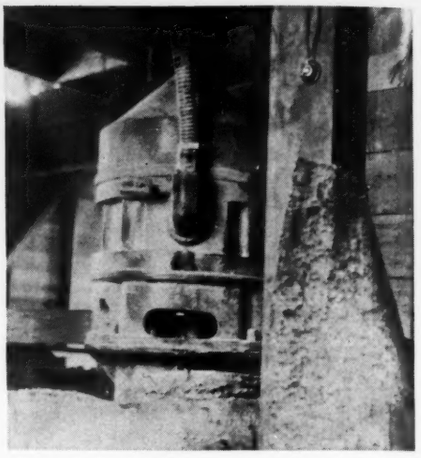
As much of the gravel is in good-sized boulders (although the percentage of the bank is only 65%), a No. 12 Allis-Chalmers gyratory is used as the primary crusher. This is set immediately below the 30-yd. track hopper in retaining walls of concrete. The crusher is fed by a "home made" apron feeder. The discharge goes by a 34-in. belt to a 72-in. by 12-ft. scalping screen on the upper floor of a building that has been erected quite recently. The rejects from this screen go to No. 7 Newhouse crushers and fall by gravity to a 24-in. belt which returns them to the hopper so that they pass again to the scalping screen. The undersize of the scalping screen goes by a 30-in. belt to the washing and screening department which is placed on the plant bins.

Two kinds of screens are used for washing and sizing, the feed being divided to a Galland-Henning 60-in. by 12-ft. cylindrical screen and three "Neotacone" screens. The "Neotacone" is a combination of three conical screens, two of them set inside the third. The middle screen is set in the opposite direction so that the direction of the feed is reversed. The products, except sand, go directly to the bins. The sand is recovered in two sand boxes, one Good Roads Machinery Co., the other of Lipmann make. The latter has drops operated by eccentrics like the drags of a Dorr classifier. The bins below the washing department will hold 12 cars.

A considerable amount of material is carried in stockpiles and is handled in and out by a 20-ton American locomotive crane with a 1½-yd. bucket.

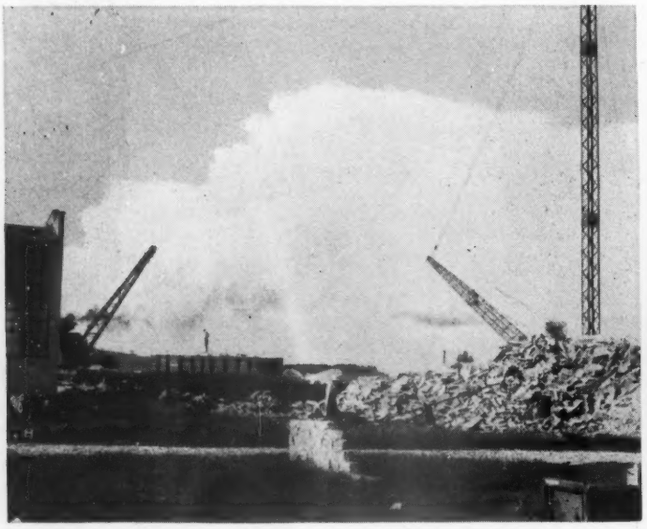
Water for washing is supplied by a 6-in. Fairbanks-Morse pump and a 6-in. American Well Works pump. A 2-in. Fairbanks-Morse pump supplies water for other purposes.

The railroad facilities are unusually good at this plant, as 44 empties and 40 loaded cars can be stored on the plant tracks.

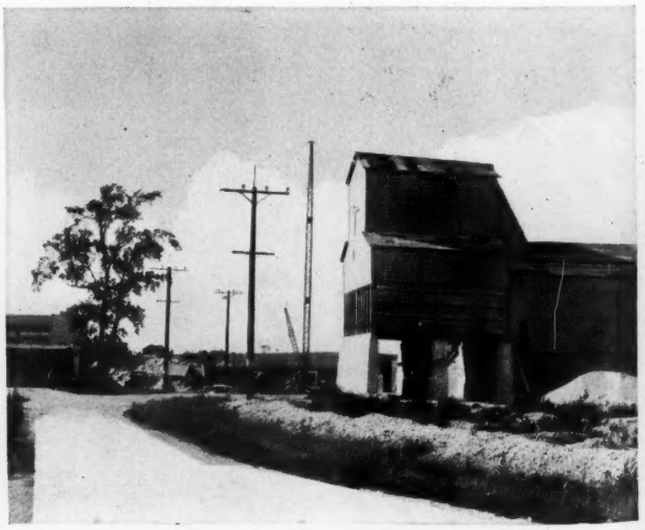


Secondary crusher installation at the North Lake plant

The office of this company is in Milwaukee. Charles P. Biesanz is president, J. W. McDermott is vice-president, I. M. Cliquennoi is secretary and sales manager. The operation is in charge of M. J. Fleming and C. E. Tufty is his assistant. The plant is at North Lake.



Handling stone at the plant of the Davis Bros. Stone Co. at Lannan, Wis.



The crushing plant at the quarry of the Davis Bros. Stone Co. at Lannan, Wis.

View of the quarry of the Davis Bros. Stone Co., showing the stratified condition of the rock

Another view of the quarry at the Davis company at Lannan, Wis.

Davis Bros. Stone Co.

On the return from North Lake to Milwaukee the route passed through Lannon, which is the great quarry center of the state, with six or seven quarries now in operation. A stop was made at only one, that of the Davis Bros. Stone Co., which formerly produced more crushed stone than it does at present, as it is now paying more attention to cut stone production. The deposit here is divided into thin ledges that split into convenient thicknesses for rough ashlars of 3-, 4- and 6-in. thicknesses. The stone comes in a variety of colors, buff gray and green predominating, and some very beautiful walls have been laid up with stone of two or more colors. Milwaukee and Chicago architects have used a great deal of the quarry's product of late as "veneer stone." John D. Ohrt is the principal owner and manager.

Notes on Plants and Practice

As noted in the introduction, there is something of a similarity among the sand and gravel plants of the district, but this applies only to those working close to the moraine where the material is fairly coarse. With the exception of the Janesville Sand and Gravel Co., however, these are the largest producers of the district, and from them one may make up what one might call the typical Wisconsin sand and gravel operation.

This operation would dig the bank by a steam or electric shovel and would bring in the material with standard gage cars and locomotives. There is a growing tendency in this area to use belts to bring in the material from the pit, but where there are many boulders to be handled the belt is not so well adapted to the work. The cars would dump into a track hopper with an apron feeder to a belt that would go to a scalping screen and primary and secondary crusher and from this would go to another belt to the regular washing and screening plant with rotary screens and sand boxes with flight conveyors.

Naturally the product of such deposits and such plants as those that have been described is excellent. The gravel is very largely hard dolomite, and "soft rock," such as bothers the gravel producers of other states, seems to be absent. Occasionally very hard black cobbles or boulders (of gabbro or basalt) are encountered, some of them hard enough to stop the smaller sizes of crushers.

No plant was noted in which the washing practice was deficient. There is water available everywhere and in all the plants the writer noted it was used plentifully and efficiently. Scrubbers were noted in only one plant. It is said that they might be used profitably in some other plants where clay seams occur in the deposits. Picking lumps of clay from the belt is the remedy adopted in such cases.

From the information that was obtainable it is judged that capitalization per ton is unusually low, when the character of the material, which requires a good deal of crushing, is taken into account. And operating costs are also low. In fact the mineral aggregate industry of the area considered is probably conducted as efficiently and economically as it is anywhere in the United States.

New Edition of Building Handbook

A NEW handbook for plastering, bricklaying and tile setting is being distributed by the March-Capron Co., 115 S. LaSalle St., Chicago, Ill. The new edition, a pocket-size booklet, is completely revised and contains the latest formulas and working tables. Details of methods and short-cuts for saving time, labor, and material form a part of this edition, which is well illustrated with photographs and drawings of actual operation. Formulas for various kinds of plaster, and tables for calculating room yardage are included in the useful data of the booklet.

Rock at the Davis Bros. Stone Co. is now used mostly for building purposes, though formerly considerable crushed stone was sold

Preparing stone for architectural use in the cutting plant of the Davis Bros. Stone Co. at Lannon, Wisconsin

Lime Burning Practice Based on European and American Observations

Part VIII—Gas-Fired Kilns vs. Mixed-Feed Kilns in Germany—The Gas Kiln of the Rheinisch Westphalischen Kalkwerke

By Victor J. Azbe
Consulting Engineer, St. Louis, Mo.

THE GAS-FIRED KILN is not particularly popular in Germany. Some plants use them, but on the average it is not an outstanding factor in lime production there. Several reasons account for this as follows:

1. The European lime consumer is not so particular about high quality. He wants good lime, of course, but appearance does not count so high as in the United States. The slightly discolored mixed-feed or ring-kiln lime suits him. The small amount of ash that such a lime may contain he considers to be of little harm and to be outbalanced by the more ununiform burn of lime from the average gas kiln.

2. The German lime producer realizes that the ordinary gas kiln is lower in fuel efficiency than the average mixed-feed kiln. While it is true that some outstanding gas-fired kilns approach the efficiency of the average mixed-feed kiln very closely, the outstanding kilns of this type are not the ones that should be entirely and only considered. Further, it is realized that even the best gas-kiln plants cannot equal the efficiency of the best mixed-feed kiln plants. It is not in the nature of things for them to be equal. A gas-kiln plant has heat losses externally of the kiln, also the heat in a gas kiln is not as uniformly distributed and cannot be as uniformly distributed through the entire kiln cross-section as in a mixed-feed kiln, where the distribution of heat can be readily accomplished by the proper distribution of coke.

3. Gas producers are costly and so are the gas conduits or flues, coal-handling equipment and other accessories necessary in a gas-kiln plant, but absent in plants of mixed-feed type of kiln. In Germany the sales price level of lime is much lower than in the United States, and so naturally the German manufacturer must be extremely careful about keeping down investment charges.

4. In labor requirements there is no question that the mixed-feed kiln is superior to the gas-fired kiln. One need not continuously fire, to blow flues, punch the producer, worry about clinkers and tar balls, steam for blast, water for agitators, etc. There is only the charging and drawing, except that charging must be more carefully done.

5. The life of a mixed-feed German kiln between repair periods is far longer than of almost any American gas-fired kiln. There are, however, gas kilns in Europe, as well as in America, that have very long life under proper conditions of operation.

6. The quality of lime, especially the quality of forkings, is naturally better with gas-fired than mixed-feed kilns.

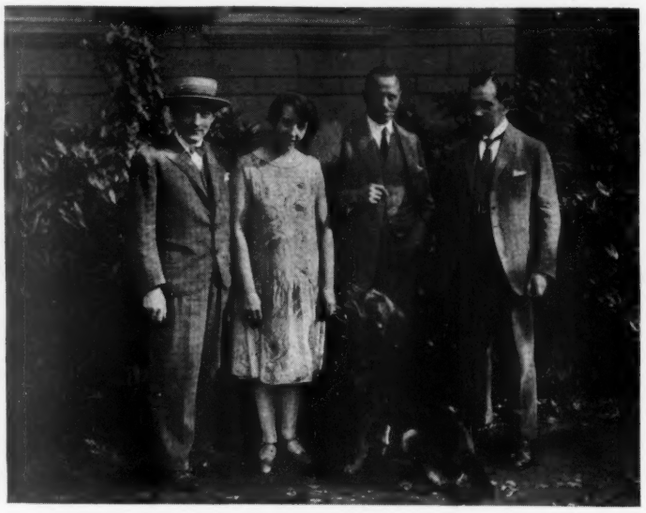


Fig. 44. Director and Mrs. P. Ludowigs, president of the Rheinisch Westphalischen Kalkwerke, in center, the plant superintendent ,and Mr. Lange

Gas Kilns of Rheinisch Westphalischen Kalkwerke

In Fig. 44 we present Director P. Ludowigs of the Rheinisch Westphalischen Kalkwerke, Wulfarth near Dusseldorf. Mr. Ludowigs is president of the second largest German lime manufacturing concern, the operators of the gas-fired lime kiln plant described herewith. With Mr. Ludowigs in the illustration is Mrs. Ludowigs, the superintendent on the left of Mr. Ludowigs and Mr. Lange, who only recently spent considerable time in the United States visiting and studying various lime plants.

Fig. 45 shows the six gas kilns of this concern at its Schlupkothen plant. The output of each of these kilns is about 55 to 60 tons of lime per day. As fuel, small coke is used, which has a heat value of about 10,000 B.t.u.; and it contains considerable—about 20%—moisture. The fuel ratio, with the fuel required for steam generation used in the producer included, was slightly less than 4 to 1. Considering the low heat value of the fuel, one may call this very good. The efficiency ranged between 50% and 55%, while there are American gas-kiln plants having fuel efficiencies of only 35%, the ratio of only 2.9 to 1, with coal of 11,000 to 12,000 B.t.u. The Schlupkothen kilns must be repaired every 10 to 11 months. The limestone burned contains 96% $CaCO_3$

The shape of the shaft in the burning zone of these gas kilns is oval; at the firing level they have a cross-section 6½ ft. by about 11½ ft., giving a shaft area of about 60 sq. ft. (Fig. 46-A).

In the study of Fig. 45 one will note that two sets of pipe lines lead to the kilns; the larger is the gas line, the smaller is the waste gas drawn from the top of the kiln and injected into the eyes with the fuel gas, for the tempering of heat. The highest temperatures obtained are 2500 deg., but the more normal temperature is 2100 to 2200 deg. F.

The superintendent of this plant fully realized the difficulty of maintaining proper heat distribution in a gas kiln. He was much opposed to shafts of over 6 ft. in diameter. Even as it was, at times conditions existed in these kilns as shown at (*B*) in Fig. 46. While at the eye the temperature was 2100 deg. F., in the kiln center it was much less; he stated as low as 1500 deg. F. This is the greatest fault of the gas-fired kiln, a fault followed by a whole string of evils. If they

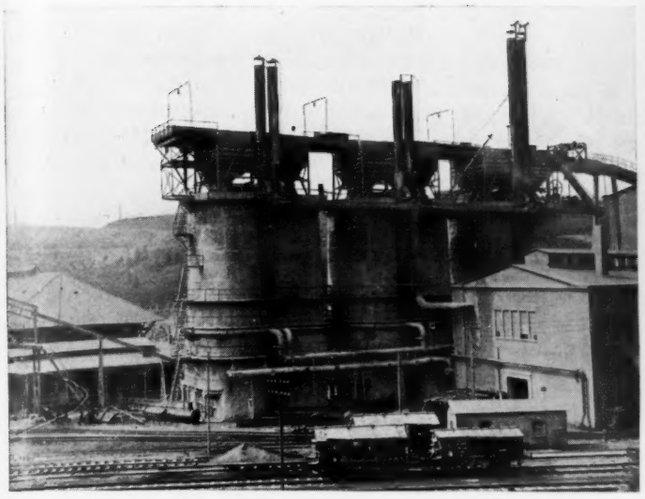


Fig. 45. The Schlupkothen plant of the Rheinisch Westphalischen Kalkwerke showing the six gas-fired kilns

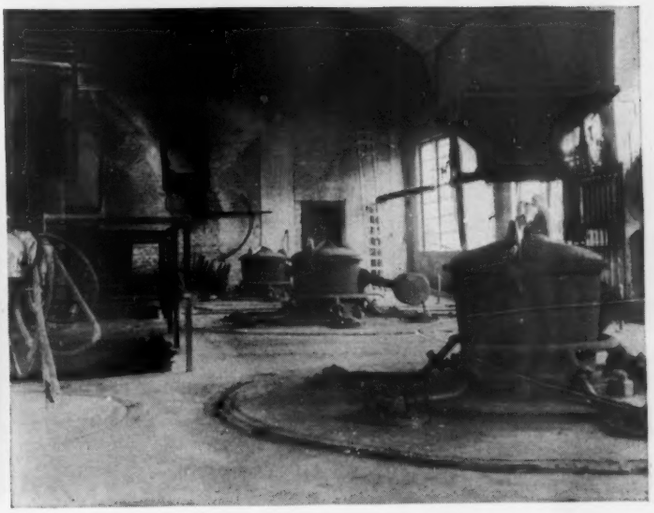


Fig. 47. The tops of three water-jacketed gas producers at the Schlupkothen works

get such ununiform temperatures on one level it certainly is puzzling that such a high fuel ratio is obtained. It is this unevenness that is mainly responsible for the inefficiency of American gas kilns; and in our kilns the situation can be somewhat corrected by a good lime burner when trimming the kiln.

"Sticking" the Kilns in Drawing Not Desired

These German kilns, however, are not trimmed (nor, as far as that goes, are any European gas kilns). They are all operated by the method described below. They do not want them to stick, as they consider it objectionable, while in the United States the opposite idea prevails.

The importance of proper trimming, which is the same as proper drawing of lime from a kiln, was lately proven in a certain American plant. By a special method applied to enable the removal of lime faster from zones where it burns faster, the ratio was increased from 3½ to 4½ tons of lime per ton of coal; in addition, the lime was of more uniform burn and was contaminated less by SO_3, and less arsenic was obtained.

These German kilns obtained the air for combustion through the cooler, the air being blown in at a central point as shown by sketch *C* of Fig. 46. The lime is drawn through six draw doors (*D*, Fig. 46) by hand, into carts. This method of drawing may appear clumsy, but has advantages over a central draw. The draw openings being located under the firing eyes, the lime is drawn more from the elevation where the most lime is made, which is as it should be. If it does require somewhat more labor to rake out the lime, that is more than offset by the better kiln performance. This method is especially desirable with kilns that are not trimmed after the drawing.

Kilns of high capacity must be charged on Sunday and preferably also at night; even better, they should be charged after each draw; therefore, stone storage bins are required. Ordinarily the bins are located on the ground. In this case, however, as shown in Fig. 45 they are on top of the kiln. The stone is brought to the bins up an incline partially shown in the illustration.

What will surprise many an American lime producer is the very small gas flue leading to the kiln. These flues, however, handle comparatively cool and clean gas, so even though they are small they need not be cleaned oftener than about four times a year.

Fig. 47 shows the tops of the three gas producers. They are rather plain, but water-jacketed at the hot zone to prevent clinker adherence to the brick wall. The coal is brought to the producer from the storage bin in the monorail, bottom-dump bucket shown in the foreground. The coal hoppers over the producers are of generous design holding one full bucket. There is no shoveling. The floor is clean; and a fair idea is obtained of the amount of coal used by each producer by the employment of this simple method.

It will also be noted that producer poke holes are connected to compressed-air pipes by special fittings. When poking the producer, the air is turned on and so no gas

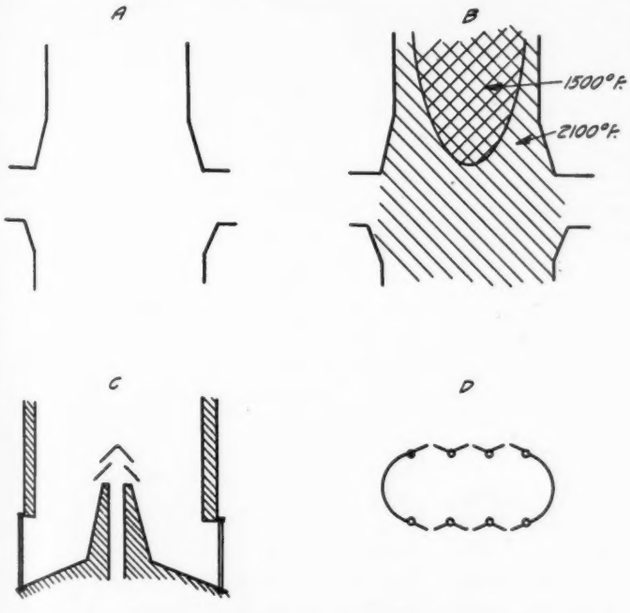


Fig. 46. Sketches of the gas-fired kilns illustrating the shape, distribution of temperature, entrance of air and arrangement for drawing

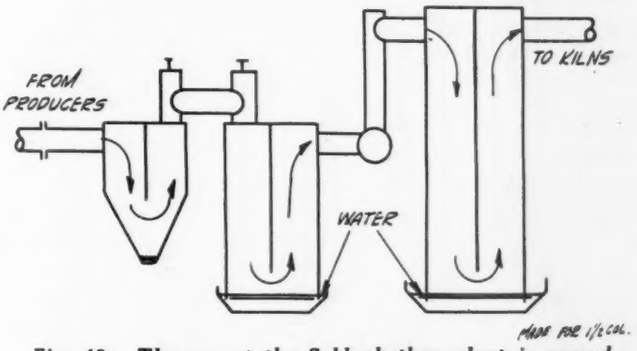


Fig. 48. The gas at the Schlupkothen plant is passed through several purifiers which remove practically all of the foreign material

escapes to be breathed by the operator. In the United States only in a few cases are these precautions taken; the health of the individual is not given very serious consideration in many cases. In Europe there are some very stringent government regulations devised for protection of the health of the workers.

It was stated that coke of small size was used in these producers. Coke, to begin with, gives a clean gas. There is little or no tar or soot; in addition, the gas at this plant is passed through several purifiers as shown in Fig. 48. They remove practically all of the coke dust or ash that may have been carried out of the producer by the otherwise clean gas.

Since the coke contains considerable moisture, the temperature of the gas leaving the producer is greatly reduced, the sensible heat being used for evaporation of the water; next the gas in passing through the purifying train becomes cooled still more, so the temperature of the gas entering the kiln is less than 500 deg. F. This loss of sensible heat, together with the low heat value of fuel to begin with, makes the high ratio rather remarkable and difficult to explain.

(To be continued.)

An Unqualified Endorsement of Agricultural Lime

Federal Government To Make Five-Year Leases of Idaho Land Contingent on Use of Lime or Limestone

THERE IS an interesting feature in the call for bids for leasing Nez Perce Indian allotments which will be opened at Fort Lapwai, Idaho, August 1, 1928. The lease on a great number of pieces of agricultural lands expires December 31 this year and the department is willing to lease from two to four years to responsible people, those now having the lease being given preference, but there is a clause that says if not less than 300 lb. of lime per acre is placed on the land by the lessee, a lease for five years will be made. This leads us to believe that the federal government, through expert tests, has decided that lime is valuable to most of the lands in this territory. A bulletin sent out with the call for bids says in part:

Quotations from Government Bulletin

"First: One of the things we need in most soils is lime.

"Second: The foundation principle of successful and national prosperity is a maximum yield from every cultivated acre.

"Third: Maximum crops are not possible when soil needs lime.

"Fourth: Lime in the soil will not take the place of drainage or manure or fertilizer. Lime will not take the place of good tillage. But drainage, manure or fertilizer or good tillage will not bring full returns without LIME in the soil.

"Lime not only supplies food that plants must have, but it takes away harmful acids that keep plants from growing, makes the soil easier to cultivate, makes other plant food in the soil available so plants can use it, makes the soil a good place for bacteria, without which the soil is sluggish. The more lime there is in the soil, the more there will be in the plants.

"In a ton of alfalfa there are about 100 lb. of lime.

"In a ton of red clover there are about 75 lb. of lime.

"In an acre of good corn there are about 25 lb. of lime.

"In an acre of good oats there are about 20 lb. of lime.

"Plenty of lime in the soil will help to keep plants from reving and winter killing. No, plenty of lime in the soil will not take the place of drainage, but on well-drained soil, plants will grow strong and have strong roots if they have plenty of lime, and strong, vigorous plants will stand a lot more freezing and thawing than weak plants will.

Lime for Bacteria Supplies Nitrogen to the Soil

"Nitrogen is one of the best plant foods—and one of the most expensive, when we have to buy it.

"We can get nitrogen by using bacteria that lives in nodules on the roots of plants. These bacteria, which make plant food out of nitrogen from the air, get sickly, and will not gather much nitrogen, and may die, in soil that needs lime.

"Put plenty of lime in the soil and these bacteria will live and multiply and work, then the plants will live and grow strong and the soil will get rich. The more lime there is in the soil, the more nodules there will be on the roots of the plants.

"Good pastures furnish the best feed for livestock. Animals like good pasture, they thrive on it, they feed themselves. Our greatest pastures, the ones on which our best breeds of animals have developed—the BLUE GRASS PASTURES OF KENTUCKY—are famed the world over for the quality of their horses, cattle, hogs and sheep. These pastures grow out of a soil naturally filled with lime. Great pastures grow only on lime-filled soil. For instance, the wonderful bunch grass pastures of Montana are all on land well filled with lime. Montana's pastures, where many thousands of cattle have been fattened ready for market with never a feed of grain—and are being received at the Chicago market as prime beef and which always bring the top prices. Convert your cheap, hilly lands into good pastures, then they won't be cheap. By using lime, you will convert this ground and grow as good and as much grass as in the level valleys.

High Calcium Limestone Specially Recommended

"There are several forms of lime for the soils; ground limestone is one of the best forms to use. Limestone is the greatest source of agricultural lime. A limestone containing 99% calcium carbonate, with no foreign substances, such as silica, which is not soluble, or magnesium carbonate, which is not a plant food element, is the right product to put on your soil. Even this high-grade limestone should be ground to a very fine powder, from the fact that the finer the limestone is ground the quicker its action in the soil. In other words, a finely ground product will give quicker results and will be sooner noticed than the coarsely ground product. The amount of lime to put on the ground depends on how finely the rock is ground. Ordinarily, from 300 lb. to one ton per acre gives very good results, but you need have no fear in putting on a ton or more per acre, as we can put on very heavy applications and do no harm to the soil. We notice that one of the leading harvesting machinery manufacturing companies, after a very exhaustive study of the subject, says that from one to two tons of finely powdered limestone to the acre may be applied without fear of overdoing it. By the larger application we will avoid the necessity of more work in making frequent applications.

"It may be spread by adjusting the opening in an ordinary drill or seeder, or it may be spread by attaching a regular lime spreader attachment to your drill or seeder.

"It is better to put lime on at any time of the year than not to put it on at all. Ground limestone can be applied any time of the year with good results. Put the lime on top and work it into the top soil as the field is prepared for planting. Ground limestone can be spread on growing crops, such as wheat, clover or alfalfa, with no damage to the crop. However, it is better to put it on before the crop is planted. We will have to figure out for ourselves the best time to put lime on our fields. We must consider the most convenient time, the time that can be spared from other important work and when the roads are best for hauling."—*Orofino* (Ida.) *Tribune.*

Digest of Literature on Nature of Setting and Hardening Processes in Portland Cement

Part IV.—Discussion on the Crystallization and the Colloid Theories

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SINCE the advancement of the crystallization theory by Le Chatelier and the colloid theory by Michaelis, there has been a never-ending debate upon the special merits of the rival hypotheses. Many of the writers who have essayed to explain the nature of the setting or hardening processes have championed one or the other of these theories. Many authors have suggested modifications of the original theories and a few have suggested that the two differed but little, or not at all, in their fundamental characteristics.

The especial interest in the nature of the setting process of cements was indicated a decade ago by a general discussion conducted by the Faraday Society in London on January 14, 1918, on the subject "The Setting of Cements and Plasters." Ten papers were presented by recognized authorities of England, France and the United States of America. In addition to these, discussions were presented by fourteen others. Many of these papers were concerned with the crystallization or the colloid theories of set.

The Crystallization Theory

Of perhaps particular interest among the papers of the symposium is a defense by Le Chatelier[18] of his crystallization theory as opposed to the colloid theory.

The principal argument set forth was based on definitions. He says:

> People evade defining what they call a colloid, but they seem to take the word in the sense of a body capable of hardening. And then the explanation comes down to this: cements harden because they have the property of hardening.

Le Chatelier then discusses the nature of the colloid state and deduces that the only singular properties possessed by colloids are insolubility and fineness. These properties go together because if the substance were not highly insoluble it could not remain finely divided in a liquid. The small particles would tend to dissolve and the larger particles would grow to greater dimensions, as takes place on heating, for example, suspensions of barium sulfate or calcium oxalate. The surface energy of colloids, however, is far greater than that of crystalloids, and becomes of greater significance than the energy of evaporation, crystallization or chemical reaction.

Le Chatelier points out that even in the case of plaster, the set material shows no crystal development under the highest power of the microscope, but that does not prove that no crystals are formed. After a number of weeks crystals may appear. Calcium aluminates behave in a similar manner. No crystals can be seen for some time, but eventually the characteristic long needle crystals appear. In the case of the calcium silicates no crystals appear even after many years. But Le Chatelier insists that "numerous analogies prevent us from denying their existence." He refers to the barium silicates and calls attention to the observation that in this case crystals can always be found of barium silicate together with barium hydroxide. The greater insolubility of the lime silicate is given as the cause of the greater fineness. He concludes:

> It is not impossible that, initially, the dimensions of these crystals are of colloidal order, as in the moment of formation of the precipitation of barium sulfate and calcium oxalate. I have shown, in fact, that this calcium silicate precipitate absorbs, in the moment of its formation, a certain quantity of lime which varies with the concentration of the liquid. In the course of time the dimensions of the crystals must increase considerably, as in all similar instances. The mechanical resistance does not diminish with time, quite the contrary. Consequently the colloid state, which was possible at the beginning, has nothing to do with the hardening of the cement.

Schott[22] has agreed with Le Chatelier that the strength of portland cement is due to the development of crystals, but believes that the crystallization of $Ca(OH)_2$ is the determining factor. He states:

> The setting of cements is chiefly due to the binding action of the slowly crystallizing, difficultly soluble $Ca(OH)_2$ which fills the pores and binds the grains of the cement. The finer the cement the larger the surface exposed to the water; therefore, the quicker the separation of $Ca(OH)_2$ and the stronger the cement. Upon exceeding a certain lime content cracks appear. An excessive crystallization of $Ca(OH)_2$ cracks cement. Where this limiting point is located is still to be discovered.

The crystallization theory, so far as it applies to plaster, has been confirmed by many investigators. The general opinion of these authors is similar to that expressed by McVay,[23] who writes: "The setting of plaster of paris depends upon the $CaSO_4 \cdot \frac{1}{2}H_2O$ going into solution and crystallizing out as $CaSO_4 \cdot 2H_2O$. This process goes forward until at least enough of the plaster has crystallized to form a bond."

The Colloid Theory

The colloid theory also has had a number of able supporters.

Rohland[24] believed that the setting of cement is essentially a colloid process, "a coagulation of colloidal materials which also is associated with some crystallization." He studied especially the influence of various salt solutions on the speed of coagulation.

The process of setting was believed by Rohland to proceed as follows: When cement is mixed with water, colloids are formed and calcium hydroxide is split off hydrolytically. This later changes to calcium carbonate. Radiating needless of monocalcium silicate are formed rapidly after the water is added, and around these a dark non-crystalline mass "which forms by far the greatest amount." The nature of this colloidal material was not determined.

Nearly all of the properties of cement were attributed by Rohland to the colloid. The swelling was said to be due to the adsorption of water by the colloid particles. The increase in temperature was thought to be due to the coagulation of the colloids, accompanied by a volume decrease. Since "colloids are poor conductors of heat, . . . the fire resistance of reinforced concrete is due to the low heat conductivity of the concrete." Workability was attributed to the colloids, since "workability is dependent on plasticity. In order to have plasticity the proper amount of water must be added, since the colloids are only formed after mixing with water. When the colloids are coagulated, the plasticity is lost." Adhesion of concrete to the reinforcing iron, he said, was due to the colloids, for "the colloids coagulate on the iron . . . and inclose it with great force." Finally, salts attack concrete only in inverse ratio to the denseness and hardness of the coagulated colloid net.

Kühl[25] has made some interesting comparisons of the two major theories of setting, and has further developed the colloid theory of Michaelis. The chemical changes involved are described as follows: The calcium silicates hydrate to give free calcium hydroxide and hydrated monocalcium silicate. The aluminates take water to form hydrated tricalcium aluminate, but no free

lime is formed. A part of the $Ca(OH)_2$ formed from the hydration of the silicates then combines with the hydrated tricalcium aluminate to form a tetracalcium aluminate.

Kühl believes that if an excess of water is present, the hardening process is due to crystal formation, but in normal mortars a large amount of colloidal matter is formed. The only crystalline materials that are determinable are a few isolated large crystals of calcium hydroxide and hydrated calcium aluminate.

The gray mass of set cement consists of an extremely fine structure whose further analysis is not possible by the microscope and whose crystallographic lines are not perceptible. If we examine it in polarized light, we see a weak diffused illumination of the mass, which may indicate the finest crystalline formation.

Hence Kühl places the material as "near the boundary between the colloidal and the crystalline state." "The hardening," he says, "depends on the cohesion of the cryptocrystalline, or pseudomorphous mass. . . . It falls within the realm of colloid chemistry."

It is assumed that there is formed at the start a highly dispersed colloidal solution of hydrated calcium silicate. The solution is precipitated or coagulated by electrolytes which are present. The initial set where the water disappears from the surface of the mortar is the result of this coagulation. The electrolytes are derived from the alkalies, the $Ca(OH)_2$ and the calcium aluminate, all of which are formed quickly on the addition of water. Less importance is attached to the crystalline calcium aluminates and $Ca(OH)_2$ in the setting process because these are less likely to form an interlocked mass than colloidal precipitates.

The conspicuous difference between the ideas of Kühl and the theory of Michaelis lies in the origin of the gel. Whereas Michaelis believed the gel was due to a swelling of an insoluble material, Kühl attempted to show that it was due to a precipitation from a supersaturated solution.

Kühl believes that the greatest hardness and strength depend upon the formation of colloidal and crystalloidal products at the same time.

This condition is fulfilled in the calcium silicates only if they are lime-rich, for only then is it possible that crystalline lime hydrate forms besides lime-poor hydrated silicates.

The opposite is true in the aluminates. Lime-rich aluminates yield only crystalline products and produce proportionate strength. Low-lime aluminates yield besides crystalline hydrated tri- or tetra-calcium aluminate, the necessary gel in the form of alumina gel, and thereby give good strengths. In portland cement the formation of alumina gel is not necessary because sufficient gel is produced by the silicates. On that account the high lime aluminates, in spite of their low strength when pure, are better in portland cement than low lime aluminates.

The ideas of Kühl have been largely confirmed by Pulfrich and Linck,[26] who studied the processes of hydration on slides under a microscope, using in a series of experiments various quantities of water. They concluded that in the presence of a large excess of water, hardening is due to the formation and interlocking of needle-like crystals, but in the presence of less water (26%) only gels form. In this case hardening depends upon the development of the gel and the withdrawal of the water. Neither hydrated crystalline calcium silicate nor hydrated calcium aluminate can form under these conditions.

The significance of the colloid state in explaining the behavior of mortars has been stressed by White.[27] He maintained that the ability of plain concrete to resist water is dependent on "the development of sufficient colloid to fill the pores." If the curing has not been sufficiently extended, there will be an inadequate amount of colloid. Hence, on drying out, a porous structure will result which permits the ready passage of water. The favorable action of soaps as waterproofing agents was attributed to their ability to function as colloidal material and fill the capillary spaces.

The alternate swelling and contracting of mortars which were placed alternately in water (or moist air) and in dry air was explained also by the colloid hypothesis. White states:

> Water continues to act on the clinker until the gel becomes packed so tightly that no more water can force its way through. The cement or concrete will retain this condition unchanged so long as it is immersed in water. If the water is removed by evaporation, the dehydrated gel shrinks and the mass becomes porous. When it is again immersed in water, capillary action carries the water rapidly through the shrunken colloid to the particles of unchanged clinker, with the result that additional hydration products are formed.

White adds that the gel retains this reversability at atmospheric temperature for at least twenty years, "and there is nothing to indicate that it may not continue indefinitely."

The colloidal behavior of tricalcium aluminate has been described by Phillips.[28] This investigator states that tricalcium aluminate, with a large excess of water, forms a suspension most of which is dispersed to a degree comparable to those colloidal suspensions which pass through a filter, do not diffuse or dialyze, show the Tyndall cone and are positively charged. In the limited amounts of water in cement pastes, it is converted into and remains a gel during the first 24 hours at least.

Even calcium hydroxide is regarded as functioning as a colloid by Justin-Mueller.[29] He states that calcium hydroxide forms "unctuous colloid gels containing varying amounts of water." The hardening of lime mortars, he writes, cannot be attributed alone to the formation of calcium carbonate, but depends very largely upon the gel-forming power of calcium hydroxide. "The desired hardening is the result of carbonate formation in the calcium hydroxide gel; on subsequent evaporation of the water, the calcium carbonate is left in a form retaining the gel structure."

Colony[30] states that a reaction takes place between the gelatinous material and the other constituents of the cement, forming a secondary amorphous product which hardens by desiccation.

Combination of Theories

The greater number of competent investigators recognize in the mechanism of setting and hardening of cements a combination of both crystallization and colloid phenomena. Each appears to play a distinct role, the absence of either of which would modify seriously the resultant effect and the consequent nature and properties of the product.

The significance of the two processes has been stressed even in the setting of plaster of paris. Traube[31] observed that a gel was first formed on the addition of water, and that this gel slowly changed into needle-shaped crystals of gypsum. Also, the hardness of the set plaster was found to be a function of the cation of any salt which was present in the mixing water.

Neville[32] obtained similar results but went further in observing the temperature-time phenomena during the set. He noted that the initial set took place before any appreciable evolution of heat had begun. Since the hydration was found to be an exothermic reaction:

$$CaSO_4 \cdot \tfrac{1}{2}H_2O + 1\tfrac{1}{2}H_2O = CaSO_4 \cdot 2H_2O + 3900 \text{ calories},$$

it appeared that the set took place before the hemihydrate had begun to hydrate. Thus it seemed that the set was due to an adsorption of water with the formation of a gel rather than to a chemical reaction with the water to form a hydrate. After the gel is formed, hydration and crystallization take place.

This conclusion was further confirmed by noting the volume changes with time during set. Contraction obtained up to the completion of the set, followed by expansion during hydration. Neville attributed the contraction to adsorption of water and the expansion to the formation of gypsum crystals. Davis[33] had noted that, on heating gypsum, the monoclinic crystals changed to rhombic gypsum before dehydration commenced, and assumed the process to be entirely reversible. He attributed the initial contraction during set to the formation of the rhombic gypsum, and the later expansion to the change in these crystals to the monoclinic form. The results of Neville seem to contradict this view, however, for in his experiments the contraction occurred only during the period up to the occurrence of the set, at which point no hydration, and consequently no formation of gypsum, had taken place.

Glasenapp[34] has reviewed the theories of setting with respect to the formation of colloids and of crystalline hydration products.

Of the colloid products which form when water acts on cement, he lists three classes of material:

(a) Those which retain the gel state for a long time,

(b) Those which solidify by becoming crystalline, and

(c) Those which retain the gel form but which must be considered as crystals because of the optical behavior.

Each of these forms is believed by Glasenapp to appear in the setting cement, but he attributes to crystallization forces a large share of the hardness, especially the increases in strength on aging. This latter he thinks is due to the change from the colloid to the crystalline state. In fact the chief value of the colloids is associated with their tendency to assume a crystalline form (as liquid crystals) and eventually to crystallize completely.

Rankin[35] has discussed the reactions of hydration of the constituent compounds of portland cement, which he asserts are lime, $5CaO \cdot 3Al_2O_3$, $3CaO \cdot Al_2O_3$, $2CaO \cdot SiO_2$ and $3CaO \cdot SiO_2$. The first two are not thought to be present in properly proportioned and properly burned clinker.

Rankin finds that the aluminates react to form hydrated tricalcium aluminate. This may be amorphous when formed, but crystallizes easily. The silicates are thought by Rankin to form an amorphous material which may be a hydrated low calcium silicate, but which may hydrolyze to form silica if sufficient water is present.

The action of water on the constituents of portland cement is summed up as follows:

The setting and hardening of portland cement involves the formation of an amorphous hydrated material which subsequently partially crystallizes; the hardness and cohesive strength at first are due to the cementing action of the amorphous material produced by the aluminate and tricalcium silicate; the gradual increase in strength is due to further hydration of these two compounds, together with the hydration of dicalcium silicate.

Rankin lays especial emphasis on the "gelatinous silicate" or "gelatinous silica," which terms he seems to use interchangeably. He attributes the high cementing value of tricalcium silicate to the circumstance that gelatinous silica is released with readiness when tricalcium silicate is mixed with water. In a later paper Rankin adds:

. . . Apparently no crystalline hydrate of the calcium silicates is formed. The gelatinous mixture of lime and silica first formed seems ultimately to become a mixture of gelatinous silica and crystalline lime hydrate. . . . From this it is evident that tricalcium silicate is the most essential constituent of portland cement, its cementing value being apparently due to the fact that it readily releases gelatinous silica when mixed with water.

Rankin admits that his discussion, "which tends to prove that gelatinous silica is the most essential constituent of a cement mortar," is somewhat speculative, but is inclined to believe in the truth of the assumption and suggests that some method by which the silica of dicalcium silicate could be released during hydration would be of immense interest to the production of better concrete.

Desch[36] is inclined to accept the crystallization theory for the setting of plasters, but points out a few observations which indicate that the process is not altogether simple. He recalls that Cloez[37] found the heat evolved during the setting to appear at two different stages, the initial rise in temperature on mixing the plaster with water being followed by a stationary period and then again by a rise in temperature. He continues:

Moreover, the density of the hydrated plaster is different from that which might be expected from the known properties of calicum sulfate and its hydrates. The hemihydrate has a density of 2.75 and the dihydrate of 2.32, and a calculation shows that the latter compound is formed from its components with a contraction of 7%, while in practice an expansion is observed, and it is in part on account of this property that plaster of paris finds its application in the making of casts, the expansion enabling it to fill the mould completely, and therefore to take an impression sharply.

Desch observes that the experiments of Davis[33] led him to the conclusion that the crystals of the dihydrate which at first separate are not identical with gypsum, but consist of a second, rhombic modification, which subsequently passes into the stable form.

Desch pointed out that the difference between the theories of LeChatelier and Michaelis was due to the fact that one worked with dilute and the other with concentrated solutions. Hatschek[38] contended that this indeed was the whole difference, and that "the two theories are not only compatible but even complimentary." He says:

It is perfectly possible that the first product of a reaction may be a gel consisting of ultramicro-crystalline elements, and that this may gradually assume a coarser crystalline structure owing to the intermediate true solution of the reaction product.

In concluding the discussion at the symposium of the Faraday Society, Desch added:

I think it is very clearly established . . . that we are dealing largely with a difference of terms; that whether one regards the jelly as a mass of extremely minute interlacing particles or not is not of very much importance. At any rate, the essential point is that in the colloidal substance the particles are extremely small, and therefore the surface forces are very important. When you come to crystals of perceptible size, such as in the crystallization of sodium sulfate, the surface forces are very small relatively to the forces of cohesion. In the case of the ultramicroscopic particles in the colloid, the surface forces are large in proportion to the forces of cohesion, and when that fact is fairly grasped it is seen that there is no great question of fact at issue between the two views.

Perhaps the present attitude of LeChatelier on the theory of hardening may be inferred from a paper by Baykoff[39] presented to the French Academy of Sciences by LeChatelier in 1926.

According to Baykoff, the first hydration of the anhydrous constituents of cement yields colloidal hydrates. Following this the gel crystallizes, producing aggregates of large crystals. Even with plaster of paris, the formation of "a genatinous mass resembling silica gel" is recorded. In order to explain the formation of colloidal calcium sulfate in the presence of water which can dissolve it:

It suffices to remark that all substances are insoluble in their saturated solutions and that the condition necessary for the formation of colloids is therefore realized.

Baykoff accordingly regards the hardening of cements as taking place in three successive stages:

The first is that of solution, during which the liquid is saturated progressively with the different soluble elements.

The second is the "colloidation" during which all the products of the chemical reaction form in the cololidal state. That corresponds to the beginning of set.

The third is that of crystallization, during which the gels are transformed into crystalline aggregates. This is the period of hardening, properly speaking.

Practically the same view with respect to the setting of calcium sulfate cements was expressed by Haddon[40] in 1924.

Comparison With Metals

The solidification of metals to form a hard and coherent mass has doubtless received more intensive study than the hardening of cements, but little effort has been made towards the correlation of the two cases.

Rosenhain[41] introduced the suggestion that cements may set in much the same manner as metals solidify from fusion. According to the theory of Rosenhain the adhesion of crystals in metals is due to the presence between them of a film of amorphous material —undercooled liquid. He adds:

We may regard cement as consisting, at one stage, of solid grains or crystals lying surrounded by a liquid solution of certain constituents. This liquid then undergoes solidification as the result of the removal of water—either by percolation or by the chemical action, such as the hydration of some of the solid material present. If the film of liquid is thick enough, this solidification may take place by crystallization, but if it is very thin it may—by analogy with the phenomena in metals—congeal in an amorphous condition. Even if there is crystallization, in the last resort the final thin films of liquid between the crystals will still solidify as "undercooled" or supersaturated liquid. It is these amorphous films or layers which give to the whole mass its great stiffness and strength, since strength and hardness appear to be essential properties of undercooled liquids.

Rosenhain then explains the hardness of such amorphous substances, including colloids, as the result of unoriented molecules:

The softness and ductility of crystalline materials—such as the ductile metals—is due to the fact that crystalline structure implies a certain geometrical arrangement of the atoms or molecules, and this results in some degree of weakness in certain of the geometrical planes. . . . In the amorphous substance, however, this geometrical arrangement of the atoms or molecules is absent; sliding of layers cannot as a rule occur at all, and any displacement must be either of

the nature of very gradual flow or sudden and complete rupture.

Laws of Solution

The basic laws governing the solution and crystallization of matter were ably applied by LeChatelier in his original theory of crystallization, but a clear understanding of these laws in their application to the setting of cements is sometimes lacking in the discussions found in the literature. It is particularly fortunate that Prof. F. G. Donnan[34] of the University of London has concisely summarized four postulations setting forth certain fundamental principles of physics in their bearing on this phenomenon. These are as follows:

1. Unequally Distributed Stress—If the solid, but not the liquid, be subjected to compressive stress, the solubility will increase. The material thus dissolved will be precipitated in contact with unstressed portions of the solid. In this way granules become cemented together by the formation of crystalline "bridges" of precipitated material. Gravitation may suffice to produce the stress.
2. Unequal Size of Granules—Very small particles have a higher solubility than larger particles. Consider a mass of granules of very different sizes, with their surfaces covered with a thin layer of saturated solution. The spaces between the larger granules will be filled with the "fines." The result is that the layer of solution on a fine particle is not in equilibrium with the layer on a neighboring large particle, so that resolution and precipitation (recrystallization) occur. In this way cementing bridges are formed and the mass sets (cakes).
3. Existence of Unstable or Metastable Forms—At any given temperature and for any given solvent an unstable (metastable crystalline form has a higher solubility than a stable, or more stable, form. Suppose that the granular mass consists of a metastable form which is slowly changing into a more stable form. Imagine a metastable and a stable particle in contact. Resolution occurs at the surface of the former and recrystallization at the surface of the latter, with the result that cementing is produced, just as in the previous cases. Very striking examples of this type of action may be quoted. Thus the formation of the well known hard boiler scale is due to the precipitation in the first instance of metastable forms of calcium carbonate or calcium sulfate, which then change into stabler forms, with resulting cementation and agglomeration. The setting of ordinary plaster of paris is another case in point. The reprecipitated (or recrystallized) material in all these cases may be so finely granular as to be practically "colloidal." Indeed, in all cases of setting the phenomena of the colloid state must be taken into account.
4. Sheared or "Flowed" Crystal Surfaces—We may call this the "Beilby effect." Owing to grinding or other shearing actions the surface layers of some of the crystalline granules may become "amorphous." Such surface layers will possess a higher solubility than the stable crystalline surfaces. Here we have another action which will tend to produce recrystallization and consequent agglomeration.

Almost no attempt has been made to apply these principles of physical behavior in a rigid or mathematical manner to the problem of cement. It appears that future advance in our understanding of the structural basis for the setting and hardening processes must involve a careful analysis of these principles.

Summary

Both theories for the setting and hardening of cements have had their champions, and likewise serious difficulties have been shown to follow the too rigid adherence to either of these unmodified theories. The present tendency seems to be to accept the general principles of the crystallization theory as set forth by LeChatelier and by Donnan, but to recognize likewise the important part played by the amorphous material, as shown by Michaelis and by Kühl. A large part of the difficulty in the mutual understanding of the two points of view is dispelled by a close examination of the theories and of the behavior of the products in question. As emphasized by Desch and by Hatschek, a closer definition of the exact significance of our terms colloid and crystalloid leads to the assurance that in the end the same forces and processes are implied, but only that the emphasis is perhaps placed on different aspects of the phenomena.

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40. C. L. Haddon, *J. Soc. Chem. Ind.*, **43** (1924), 34.

41. W. Rosenhain, *Trans. Faraday Soc.*, **14** (1919), 52.

42. F. G. Donnan, *Trans. Faraday Soc.*, **14** (1919), 12.

(To be continued.)

Mining Industry of Idaho

THE 29th annual report of the "Mining Industry of Idaho," contains 280 pages giving a detailed account of the mining activities for the year 1927. A general review tells of the increased resources of producing mines, new dividend-paying mines, new ore disclosures of importance, new reduction plants and dredges, and new enterprises of each county of the state. Three special articles are included in the report which describe the electrolytic zinc plant of the Sullivan Mining Co., the Belshazzer mill of the Idawa Gold Mining Co., and mine rescue work in the Couer d'Alene district.

According to the table on classification of accidents, the chief cause of mishaps were due to falling rock or ore from roof or wall, falling rock or ore while loading at working face or chute, and careless handling of explosives. Records show that the accident rate is in direct proportion to the efforts given to maintaining and enforcing safety.

Idaho has extensive deposits of nonmetallic minerals, many of which, such as gypsum, limestone and marble, have been but slightly exploited due to the low price of the crude product limiting production to those states located near the centers of population. The greatest potential mineral resource in Idaho is in the immense phosphate deposits in the southeastern part of the state which are estimated at approximately 5 billion long tons or over 80% of the total phosphate reserves.

Under an alphabetical list of counties, giving the county's location, area, population, highways and importance as a mining county are listed the mining companies of each county. The location of office and plant, officers, date of incorporation, capital, property, development, plant equipment, ore mined, average number of men employed and miscellaneous remarks are included in this section which represents 70% of the contents of the bulletin.

At the end of the bulletin is given a list of delinquent mining companies, a general bibliography, and metal production statistics for Idaho since 1903.

Chicago's Newest Crushed-Stone and Sand Handling Plant

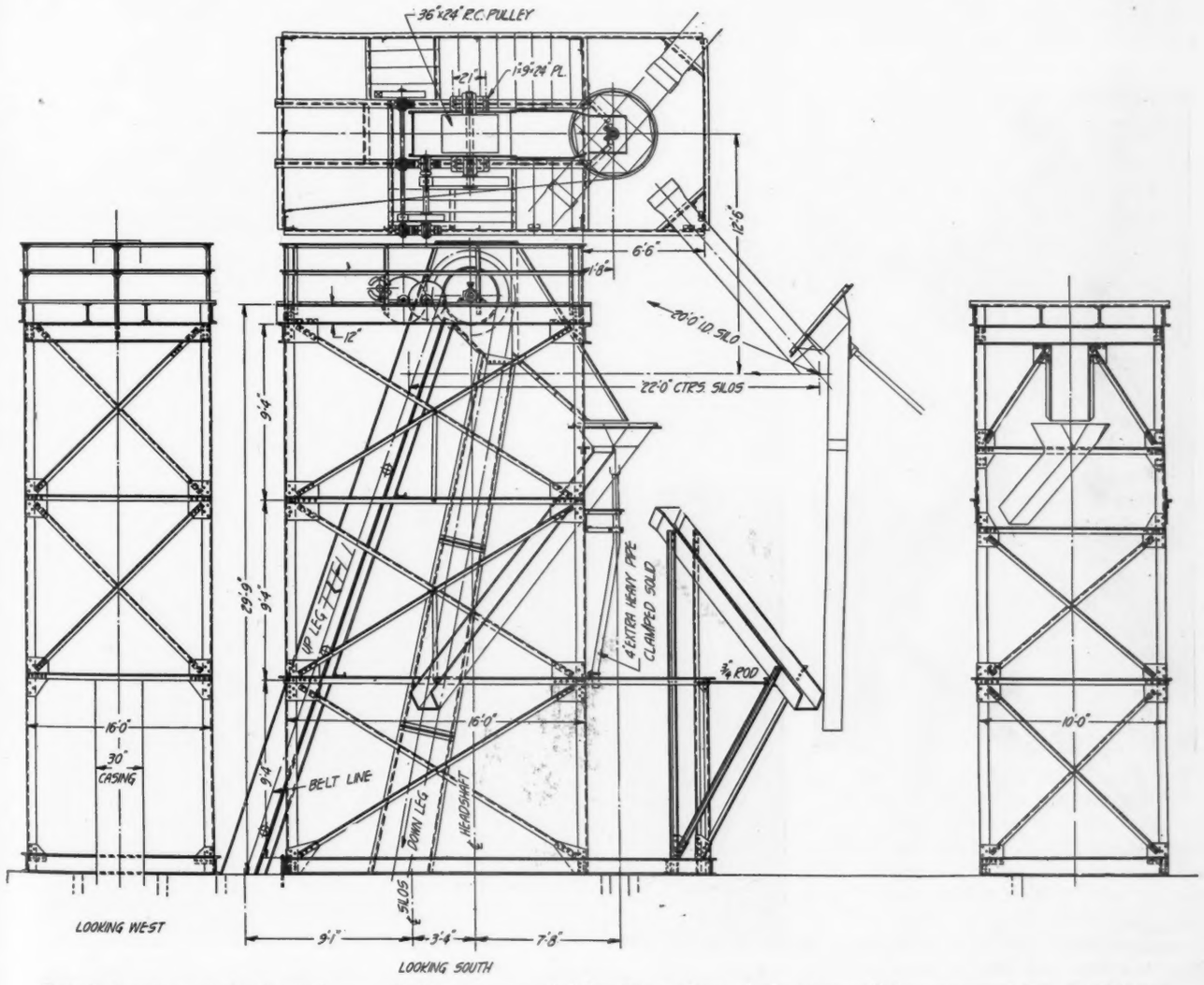
Brownell Improvement Co. Completes Model Plant for the Distribution of Its Products in the Chicago Area

ONE of the most recent additions to the distribution equipment for rock products in the Chicago area is the new plant of the Brownell Improvement Co. at 76th street and Claremont avenue, on the far southwest side of the city. This plant has only been in operation for two months, but already is filling a prominent place in the distribution of stone and sand in that portion of the city. Situated conveniently to a number of trunk lines and switch tracks, it has good facilities for bringing in its material, and the rapidly growing section of the city supplies a ready market. The plant itself is of the most modern construction, substantially built and with the latest improvements in equipment and machinery.

Monolithic Storage Bins

The service bins consists of four concrete storage bins of the monolithic type 21 ft. inside diameter and 40 ft. high, placed in a cluster affording two driveways underneath, with a fifth bin 12 ft. in diameter, of ⅜-in. steel plate, placed in the center. Each concrete silo is provided with a batch measuring hopper placed in a recess in the center of the floor slab and a 12x15-in. clamshell gate on each side, reclaiming practically all the material remaining on the bottom. All gates and batchers are placed so as to provide a clearance of 9 ft. for trucks.

The receiving track hopper is 12 ft. wide by 24 ft. long and is made up of two separate units. They are made of ¼-in. steel plate sloping 50 deg. into the conveyor openings below, assuring self cleaning discharge of sand and stone by gravity. Below the track hoppers are two independent corrugated steel apron conveyors of 3/16-in. steel thoroughly hot-galvanized to prevent rusting, which might result from handling of the wet torpedo sand. Both conveyors, which are 12 ft. centers, are independently driven by 5-hp. motors directly geared to worm gear speed



Detail drawing of the head frame of the new material handling plant of the Brownell Improvement Co. at Chicago

General view of the Brownell plant showing the chute arrangement to each bin. The company's office is at the right

reducers. These are timed to deliver the full capacity of the plant over either unit. By means of flow regulating gates both conveyors operate only half loaded for full capacity of the elevator.

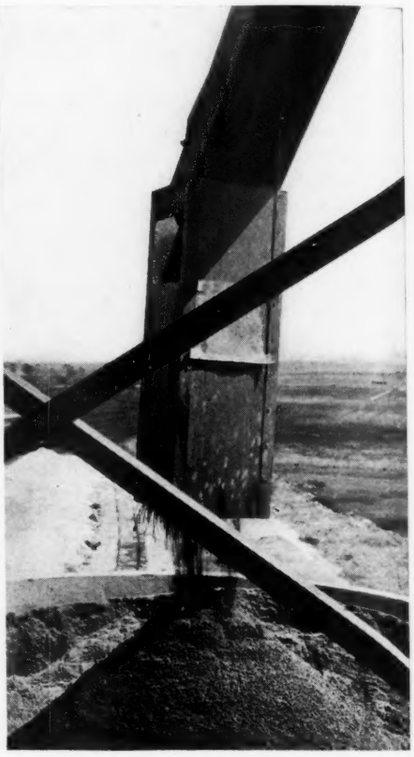
The continuous bucket elevator has a capacity of 250 tons per hour, is on 90-ft. centers inclined 70 deg. and uses 18x9x12-in. continuous buckets mounted on an 8-ply 36-oz. belt with 1/16-in. rubber cover. The head shaft of this elevator is 4 7/16-in. in diameter and is mounted on a substantial structural steel head frame 75 ft. above the street level. There are two countershafts fitted with steel cut gears and coupled to a 30-hp. Allis-Chalmers slip ring induction motor fitted with a Bakelite spur pinion. The elevator is enclosed in a sheet steel casing in two separate legs. The up leg is provided with Hyatt roller bearing rollers every 10 ft. The down leg provides for the natural sag of the belt and buckets for all temperature variations and slackness of the belt. By enclosing the elevator completely, no spillage of sand is permitted and the space around the elevator at the grade line is always clean and free from stone.

The head chute and turnspout which delivers material to the five bin chutes

Distribution to the Bins

The head chute or throat is fitted with a 1-in. thick liner plate delivering to the elbow of the turnspout. This turnspout is mounted on roller bearings and is controlled from the ground by means of a wall winch attached to the silo, which will spot the elbow into any of the five separate chutes, delivering to bins. The steel center bin is used for 1-in. granite and, like the concrete silos, is equipped with a Seaverns' batch measuring hopper. The bottom of this steel silo is a solid fill from ground line to gate outlets, thus avoiding heavy construction for a bin floor where it is not necessary.

The plant was designed and built by the James B. Seaverns Co., Batavia, Ill., who also built the entire machinery equipment—

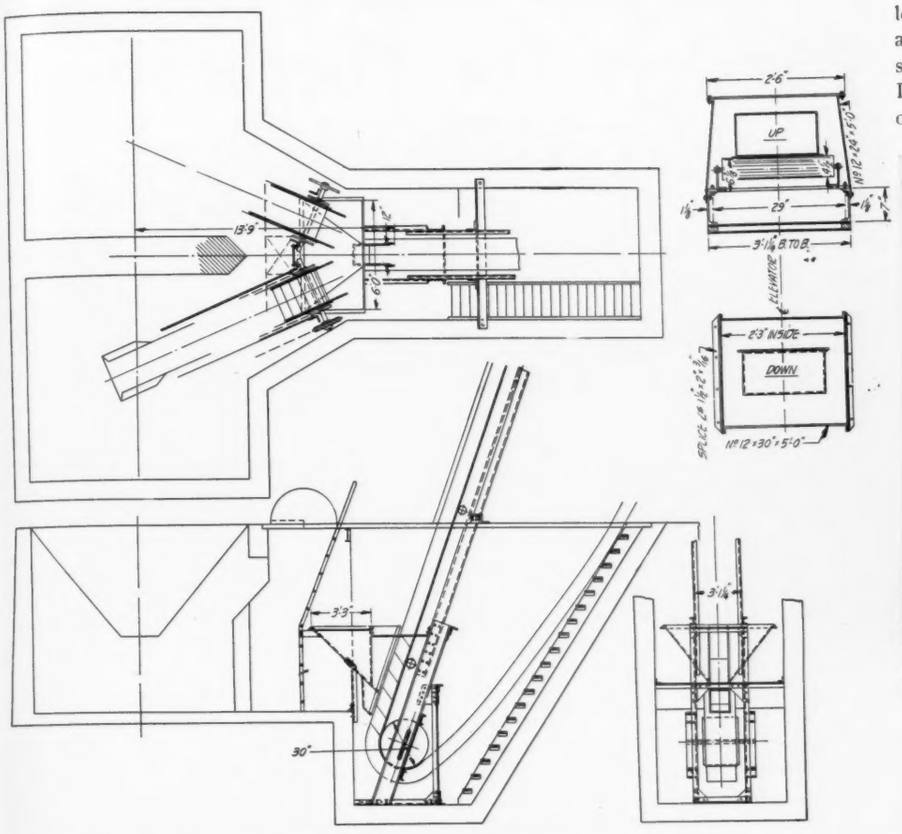


Type of spout used at the bottom of each bin chute

batch hoppers and clamshell gates. The concrete silos were built by Miller and Weaver of Durand, Ill., builders of large silos.

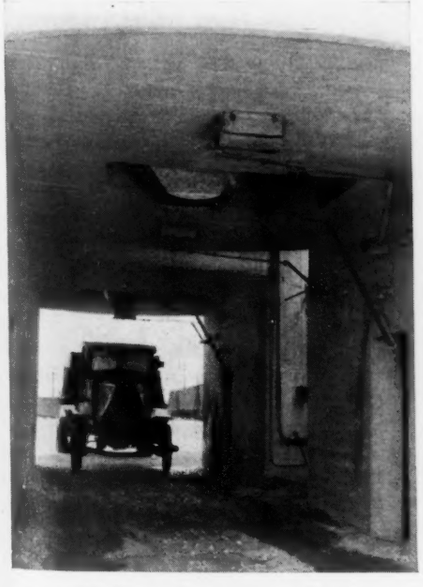
The cost of the plant proper was $25,000. There is a new office building of press brick construction with a 30-ton truck scale. All

Railroad cars are spotted over the pit by a car puller and dump to a bar grizzly over two apron conveyors which feed the bucket elevator



Sketch showing the general arrangement of the pit machinery at the Brownell plant

driveways are of macadam, level and smooth, affording good pavement for the largest trucks being served at this yard. The handling plant serves a large and fast-growing territory over the southwest portion of Chicago. The stone for this plant is brought to Chicago from the company's quarry and plant at Thornton, Ill., south of the city.



One of the two driveways which pass beneath the bins showing the arrangement of the batching hopper

New Indianapolis Gravel Plant Begins Production

THE new gravel plant of the Lick Creek Gravel Co., Indianapolis, Ind., which was recently put into operation, is headed by E. Howard Cadle. The plant has a tipple and the bins are 72 ft. high and have a storage capacity of 400 cu. yd. of gravel. The steel mast, by which the bucket hoists the gravel to the top of the tipple, towers 90 ft. in the air. The plant was erected at a cost of approximately $30,000.

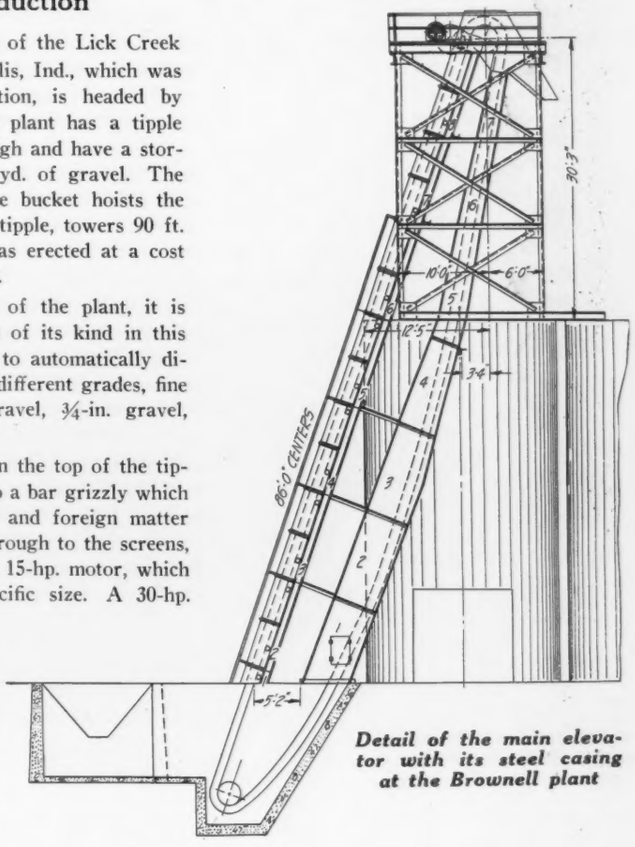
According to officials of the plant, it is one of the most modern of its kind in this section, and is equipped to automatically divide the gravel into six different grades, fine sand, grit sand, pea gravel, ¾-in. gravel, 2-in. and 3-in. gravel.

After being dumped on the top of the tipple, the gravel falls on to a bar grizzly which removes all large rocks and foreign matter from it. It then falls through to the screens, which are revolved by a 15-hp. motor, which separate it into its specific size. A 30-hp. motor pumps 500 gallons of water a minute to the gravel.

The bins are located directly beneath the tipple, while construction of the plant allows vehicles to drive beneath the bins for loading. Loading, by means of chutes, also is a mechanical process. The plant was constructed by the Knox Engineering Co. of Indianapolis and the Page Engineering Co. of Chicago.

View of the material handling plant showing driveway entrance at the left, and also outside loading chutes

The output of the company is said to be a good quality gravel, while its supply is said to run 60 ft. deep over a 30-acre tract. It is estimated that it would take 40 years' constant digging, day and night, to exhaust the supply.—*Indianapolis* (Ind.) *News.*



Detail of the main elevator with its steel casing at the Brownell plant

Gypsum Feeders for Portland Cement Mills

Importance of Accurate Proportioning to Present Demands for Quality Cement

By Raymond B. Ladoo
U. S. Gypsum Co., Chicago, Ill.

GYPSUM has been used as a retarder for portland cement for many years, but only within the past few years has the importance of feeding gypsum into the clinker grinders uniformly and accurately been fully realized. One reason for this has been that, in general, the accurate use of gypsum in the past was not as important a factor as it is today. With the relatively coarse grinding of cement formerly practiced, less SO_3 was needed to retard the set, and considerable variation in the SO_3 content of the finished cement was permissible without running the risk of quick-set, on the one hand, or of exceeding the specification limit of SO_3, on the other hand. Furthermore, the importance of SO_3 as a strength producer was not generally realized, nor was there the general demand for high strengths and early development of strength that there is today. It is true that some cement manufacturers had to carry their SO_3 very close to the specification limit in order properly to retard the set, but this was not a common condition.

Today the demands of the trade for high strength cement and for early development of strength are compelling the use of more SO_3 for two reasons. First, many cement makers are grinding their finished cement much finer than formerly (85% to 90% through 200-mesh grinding is now quite common practice), in order to produce greater strength and earlier high strength. Finer grinding means a more active cement —a cement more difficult to retard, and this means more SO_3 must be used to retard the set. Second, the value of SO_3 as a strength producer of itself is becoming more generally appreciated and a higher SO_3 content is being used for this reason.

When an average of only 1.5% of SO_3 was used, and with the A.S.T.M. specification limit of 2.0% of SO_3, there was plenty of leeway so that the amount of gypsum added could fluctuate considerably without any danger. But today many cement plants are using 1.75%, 1.80%, and even 1.90% of SO_3 in their cement. Some cement chemists would like to use even more but are held down by the present 2.0% SO_3 specification limit. Foreign cement practice and many tests made in this country show that 2.5% or even 3.0% of SO_3 is not injurious to the quality of the cement. There seems to be quite a widespread and growing feeling among many cement companies that the specification limit of SO_3 should be raised at least to 2.5%.

Under present conditions, however, it is evident that the amount of gypsum added must be regulated very closely. To do this automatic gypsum feeding devices of various types have been developed. Most of these are fairly satisfactory under perfect operating conditions and where great accuracy of control is not essential. But no single type of feeder is yet in common use which is uniformly satisfactory under all operating conditions.

It is the object of this paper to consider, first, the characteristics of gypsum rock used as a retarder; second, the conditions under which it is shipped, unloaded, stored and used; and, third, the various types of feeders now in use with their advantages and disadvantages.

Characteristics of Gypsum Rock

Gypsum is a soft, easily broken and abraded rock, usually containing more or less anhydrite, together with impurities such as limestone, shale, sand, etc. Gypsum is hydrous calcium sulphate ($CaSO_4 \cdot 2H_2O$), while anhydrite is water-free calcium sulphate ($CaSO_4$).

While there has been some prejudice against the use of anhydrite as a retarder, large scale use of gypsum-anhydrite mixtures by many cement companies during the past few years has demonstrated that under modern, practical, cement-mill conditions its retarding effect is equal to that of gypsum. Gypsums now in actual use by cement mills vary in SO_3 content from about 34% to about 50%. Theoretically pure gypsum contains 46.5% SO_3, 20.9% water and 32.6% CaO. Pure anhydrite contains 58.8% SO_3 and 41.2% CaO.

Gypsums from different localities vary in apparent hardness and toughness. The true hardness of gypsum from all localities is probably about the same, but physical structures show great variation. The twining of gypsum crystals probably has considerable effect on the crushing characteristics.

Various methods of crushing and handling are also used, so that the resulting products, as received by the cement mills, show quite a range in the amount and nature of fines. This question of fines is important, as it is one of the chief factors in the selection and operation of feeding devices.

An important characteristic of crushed gypsum is its tendency to absorb and hold moisture, both from the atmosphere and from other sources. Damp gypsum containing considerable fines is sticky and cakes or packs into a rather hard mass. This difficulty is one with which both gypsum producers and cement companies have to contend with, and makes the mechanical feeding of gypsum a difficult problem. Even carefully screened rock, from which the fines have supposedly been removed, may contain enough fines adhering to the larger lumps or made by rehandling to cause trouble if the rock becomes wet.

On the other hand, if the fines are bone dry their flowability is very high—so high in fact that under certain conditions they have a tendency to flood, in elevators, spouts and feeders, almost like water. Moderately dry fines are probably the easiest to handle, store and feed.

While gypsum fines may be difficult to handle and to feed, yet screened rock, unless previously dried, sometimes contains enough fines adhering to the coarser lumps to cause trouble if the fines have a chance to segregate.

Fines have several advantages over coarse rock with the fines screened out. First, there are no coarse lumps to clog up feeding devices. Second, since gypsum must be ground to an extremely fine powder (much finer than cement) in order for it to go quickly into solution and do its work, the finer it is when it enters the clinker grinding mill, the more readily and surely will the necessary extreme fines be produced. Third, fine gypsum can be much more uniformly distributed throughout the cement than coarse gypsum even with the same accuracy of feeding. A 1½-in. diameter cube of gypsum will make 216 ¼-in. cubes. It is evident that the much larger number of small particles will permit a more uniform distribution of gypsum and therefore of the SO_3 in the finished cement.

Where the impurities are of about the same hardness and toughness as the gypsum, there is very little difference in analysis between coarse, crushed, lump gypsum with the fines screened out and that of the fines themselves. Where the impurities are harder and tougher than gypsum, they tend to be concentrated in the coarser sizes so that the fines are higher in SO_3 than the lumps. Where the impurities are largely clay and sand, the fines are liable to be lower in SO_3 than the lumps (provided the lumps are screened out). But if the whole rock is crushed to make it all into fines, there is, of course, no change in the SO_3 content.

The combined water content of gypsum (20.9%) is very loosely held. While it is generally assumed that gypsum begins to give off its water of crystallization at 107 deg. C. (224 deg. F.), yet under certain conditions it may give off water at as low as temperatures as 45 deg C. (113 deg. F.), or even lower.*

Steiger† has called attention to the fact that by mere laboratory grinding, where no appreciable heat is generated, much of the water of gypsum may be liberated. Water of crystallization of gypsum may also be drawn off at room temperature in a sulphuric acid dessicator. In the same way, under certain conditions, anhydrite tends to pick up water to form gypsum. The effect of this property is that in the crushing, grinding, transporting, storing and using of gypsum, the water content (and consequently the SO_3 content) is constantly changing. Accurate analysis of gypsum by present known methods is very difficult for this reason.

The ease with which gypsum loses its water of crystallization has caused some misconceptions in the cement industry as to what happens to gypsum in the cement-clinker, grinding mill. It has often been assumed that either the gypsum passes through the mill and into the finished cement unchanged chemically, or that the temperature of the grinding mill is such that three-quarters of the combined water is driven out and plaster of Paris is formed. Some cement men even go so far as to object to fine gypsum on the ground that fines are more easily converted into plaster of Paris than coarse rock, that when grinding hot clinker plaster is formed, and that this plaster causes a "false quick-set" or "plaster of Paris quick-set". Others go even further and say that anhydrite is formed under these conditions and the "anhydrite" causes the false quick-set.

As a matter of fact, the combination of heat of grinding, heavy pressure of ball charge and clinker and intense grinding by impact and attrition, is probably sufficient to drive out practically all the water, going much beyond the plaster stage, even when grinding seasoned clinker. The average amount of gypsum normally used in cement today would alone give a loss on ignition in the finished cement of about 0.75%, if it passed into the cement as gypsum unchanged. If it was in the form of plaster in the finished cement, it would give an ignition loss of about 0.2%. But we must assume that the unretarded clinker would show an appreciable ignition loss without the gypsum (due to content of carbon dioxide, free sulphur, water, etc.). Since some good, properly retarded cements show as little as 0.15% total ignition loss with the average amount of gypsum added it is evident that practically all the gypsum has been changed to the anhydrous form.

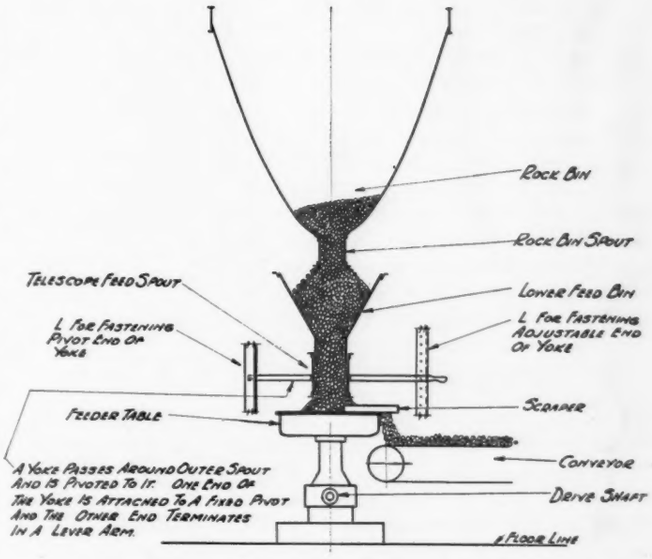


Fig. 1. Double feed bins by which a constant flow can be maintained to the feeder

A number of cement chemists have proved that the cause of quick set when grinding hot clinker is not connected in any way with the gypsum used nor with the possible formation of plaster of Paris or anhydrite, but is due to the hot clinker itself and the resulting low ignition loss of the finished cement. Grinding hot clinker in itself is a very common cause of quick-set, regardless of the physical or chemical characteristics of the retarder used. That plaster of Paris does not cause quick-set, either false or true, is proved by the fact originally it was used exclusively as a retarder, before the introduction of gypsum. Recent research work has proved that pure anhydrite, as well as mixtures of anhydrite and gypsum, is as good a retarder as gypsum. From all the evidence available it hardly seems possible that gypsum fines can have any effect on the setting time of cement.

Handling and Storage Problems

There are four general sizes of gypsum rock now used by cement companies, No. 1, which is ½-in. to dust, all fines left in; No. 2, which is a screened rock, all fines removed with 1⅛- to 1½-in. as the maximum size and ¼- to ½-in as the minimum size—a fines tolerance of 10% to 20% is usually allowed; No. 3, which is 1¼- or 1½-in. to dust, all fines left in; No. 5, which is a specially dried fine rock, crushed to ¼-in. Sometimes the fines smaller than 8- or 10-mesh are removed and sometimes they are left in.

All of the sizes which include fines, that is, all but No. 2, are usually shipped in box cars. The No. 2 rock is sometimes shipped in box cars, sometimes in hopper-bottom gondolas and sometimes in flat-bottomed gondolas. Box-car shipments are generally unloaded by hand shovel and wheelbarrow. Open-top cars are unloaded either by crane and bucket or by dropping the hopper doors and letting the rock slide out, usually into a receiving hopper below the track.

Adequate inside covered storage for gypsum is usually provided in plants built in recent years. In older plants, inside storage space is either usually lacking or very small (from 10 to 100 tons), while outside storage space is usually either inadequate or inconveniently located, or both. At some plants practically no gypsum storage space is provided, either inside or outside, and the operation of the mill is dependent on receiving the cars of gypsum at very regular intervals and using the rock direct from the cars as it is unloaded. At some plants an inactive storage is maintained on the ground somewhere in the plant yard, from which the gypsum can only be removed by wheelbarrow or truck. If this rock contains any fines at all, even the smallest amounts usually present in screened rock, it gradually packs down and hardens so that it is very difficult to reclaim, especially in winter weather. In addition the pile usually gets contaminated with cement and coal dust and other foreign mater so that it is not a very desirable material to use. Rock stored in this way is often never reclaimed and is thus of little value. Outside storage under a trestle near the point of use is better, but no outside storage for gypsum is really satisfactory.

For inside storage probably the silo system is best. The gypsum is unloaded from the cars and transported by elevators or conveyors or both into large silos. It is drawn off from the bottoms of the silos by belt con-

*Welch, F. C., Analysis of Gypsum and Gypsum Products; *Ind. and Eng. Chem.*, Vol. 16, No. 3, p. 238, March, 1924.

†Steiger, George, Errors in Chemical Analysis of Gypsum, in Gypsum Deposits of the U. S.; U. S. Geol. Surv. Bull. 697, 1920, 30-32.

veyors as needed without rehandling. The next best inside storage is where a portion of a large rectangular raw rock or clinker storage bin, served by a traveling bridge crane or railroad crane, is walled off at one end and used for gypsum. Gypsum is transferred from the main storage bin by crane to a small feed hopper above the feeding device. This system is good but it involves rehandling the rock. There is quite a common practice to use one large storage handling the materials with a crane and use this for coal, clinker, raw materials and gypsum. Quite frequently on the score of economy a gypsum bin is not provided and in consequence of this, the gypsum is very apt to accumulate dirt and dust, and what is worse, clinker and coal droppings from the bucket of the crane.

If storage silos are used for fine crushed, dried gypsum, they should not be of too large diameter. The flowability of fine dried gypsum is so great that it tends to flow too rapidly, or flood, like water, when drawn off the bottom of bins. Large diameter bins give more trouble from this cause than those of small diameter.

It is not generally appreciated that the handling system preceding the feeder is just as important as the feeder itself. No matter how efficient the feeder is, it is useless unless gypsum is supplied to it regularly and in proper volume. The International Cement Corp. has given this problem much study and its engineers feel that their solution of it is as important as the feeder they use with it. The fundamental principle of their system involves the use of double feed bins, as shown in Fig. 1. The main bin has very steep sides, 60 deg. or steeper, and one side may be vertical. The lower end terminates in an opening about 2 ft. square. About 1 ft. or 18 in. below this is a small bin, 3 or 4 ft. square at the top, with very steep sides, terminating in the fixed part of the telescopic pipe which leads to the table feeder. The gypsum from the upper bin flows down and fills the lower bin, heaping up on the top of the bin until it reaches its angle of repose, and then stops. As the gypsum is used out of the lower bin, it flows on down through the system, keeping the smaller bin full. If the flow to the lower bin is interrupted, the heap of gypsum in sight on top of the bin will disappear and give warning that the upper bin is either empty or clogged. The reserve supply in the lower bin is sufficient to keep on running until the flow from the bin above can be started again. In other words, it acts like a sight-feed lubricating oil cup.

The Merrick Scale Co., Passaic, N. J., in connection with their "gypsum proportionate feeder," recommends a special type of bin construction to insure a full supply of gypsum reaching their feeder at all times. Their feeder is set below a flat bottom, circular gypsum silo. Four feed spouts are led down from four different places in the silo bottom, to the feed hopper on the feeder. Any one of these spouts is large enough to furnish all the gypsum needed, but the four equally spaced spouts help to draw the bin down uniformly, prevent arching, and provide alternative spouts if one or more becomes clogged.

In considering the whole subject of gypsum feeding it must not be overlooked that no matter how carefully and accurately the gypsum is fed, erratic SO_3 contents will result unless the clinker is also fed accurately and uniformly. This important point is sometimes neglected. When setting times and SO_3 contents become erratic there is often a tendency to blame either the gypsum or the gypsum feeder, when the clinker feeder may just as often be at fault. The SO_3 content of a given gypsum rock will not ordinarily vary more than 2% or 3%, and a difference of 3% in the rock will make a variation of SO_3 in the finished cement of only about 0.10%. Control of SO_3 in cement within 0.10% is not common. Thus large fluctuations in SO_3 content in the cement may usually be attributed to either the gypsum feeder or the clinker feeder or both.

Not long ago a large, new cement plant had trouble with setting time and with variable SO_3 content in the cement. The gypsum feeder was found to be functioning perfectly and, therefore, the gypsum itself was blamed. It was said that a uniform amount of gypsum was being fed in regularly, but the SO_3 in the cement was ranging from 0.5 to 2.5%. This was attributed to variable SO_3 in the gypsum. The SO_3 in the gypsum would have had to vary as much as 60% when really it varied only about 2%. Later it was found that the clinker feeder was not working properly, and when this was corrected the trouble ceased.

One precaution should be particularly noted, that where run-of-crusher gypsum is used there is apt to be segregation between the fines and the coarse, if these are placed in a bin or pile, and if there is any difference between the SO_3 content of the fine and coarse material, this segregation would have to be watched out for. It is, of course, less with a tall, narrow bin than with a low, wide bin where the coarse material has a chance to roll to the outside.

Methods of Feeding

Gypsum is now fed into clinker grinding mills in a great variety of ways, some entirely by hand, some by semi-automatic feeders, and some by wholly automatic feeders. It is not the purpose of this article to criticize present methods, nor to favor one type or make of feeder over others. An effort will be made to summarize present practice, describe various feeders and set down the comments on each type expressed by the users in the cement industry. It is fully realized that local conditions are of great importance in determining the choice of a feeder, and no one type of feeder is best for all possible conditions. Nearly everyone agrees, however, that some form of automatic or semi-automatic feeder is much to be preferred to simple hand feeding.

Hand Feeding

The crudest and least uniform method of feeding gypsum is by adding gypsum to the clinker by means of a crane bucket. Gypsum is stored in a pile at one end of a large pile in the storage bin of clinker. A traveling crane picks up a bucket full of gypsum, travels to the clinker pile, then partly opens the bucket and allows the gypsum to spill out, while the crane is in motion, along the top of a pile of clinker. Then the crane picks up a bucket load of the clinker with gypsum on top and transfers it to a bin or conveyor leading to the clinker grinding mill. It is obvious that there is virtually no control over the amount of gypsum added, and the SO_3 in the cement must vary within very wide limits. It is hard to see how this method can still survive under present-day cement-making conditions. Its only virtue is its simplicity.

A somewhat more accurate method is by the use of a wheelbarrow. A wheelbarrow is loaded with gypsum (sometimes in weighed quantities, but more often by guess) and dumped together with the clinker into a hopper or on a belt conveyor loading to the grinding mill. One wheelbarrow load is dumped in for each roughly measured or weighed batch of clinker. The clinker is sometimes measured and added in wheelbarrows, but more often by means of a big revolving hopper weighing device which measures or weighs a definite quantity of clinker and then dumps automatically.

This method is further refined by the use of small wooden or metal measuring boxes. Several such boxes are provided of various sizes to hold definitely weighed amounts of gypsum when level full. An operator shovels gypsum into the box of proper size to give the desired amount of SO_3 in the cement and strikes off the surplus level. The box is dumped into the clinker stream along with definitely measured or weighed batches of clinker. The revolving barrel or hopper weigher noted above is the clinker measuring device most commonly used with the hand-measuring box. Sometimes a bell rings or a light is lighted each time the clinker hopper dumps, to signal the workman to dump a box full of gypsum. In some cases the measuring box has a false, sliding bottom and is fixed permanently over the revolving cylinder dumping point. The box is filled level full and each time the cylinder dumps the slide is pulled out, either automatically or by hand, allowing the gypsum to fall into the clinker stream.

This method has the merit of being quickly and easily adjusted to add more or less SO_3 and is quite accurate if care is taken that the boxes are filled uniformly. The disadvantages are that it requires the

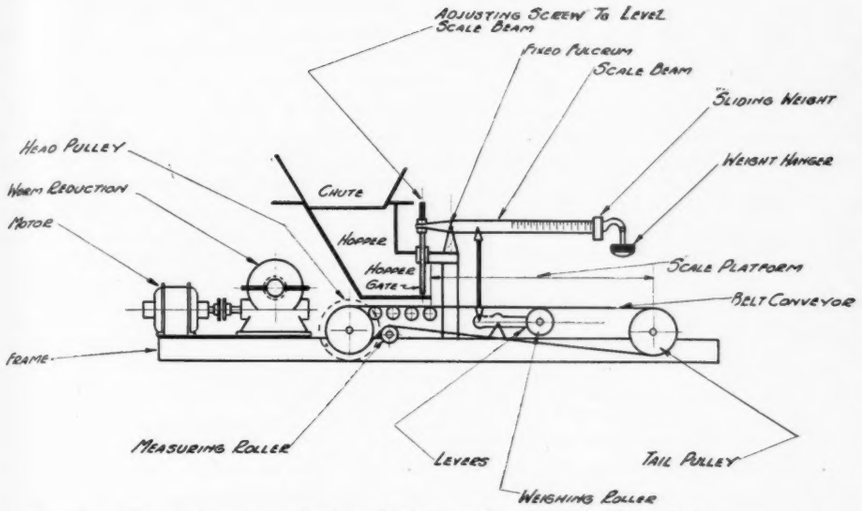


Fig. 2. Automatic proportioning device made up of a short belt conveyor provided with a weighing mechanism

full time of one man on each shift; that the system is only as dependable as the man doing the work; and that the gypsum is added in single batches at intervals instead of continuously in small quantities. If the workman is careless or negligent the whole system falls down.

In a few plants where hand feeding is practiced the weighed charge of gypsum is dumped into a hopper over a feeding device, such as a screw feeder or a shaking pan, so that it is fed into the clinker stream with a small, steady flow instead of in batches.

Opinions differ as to the importance of a thorough and uniform mixing of the retarder with the clinker before grinding. Some claim that the gypsum and clinker are so thoroughly mixed in the tube mill that a uniform mixture of the feed is not important. This may be true in some mills, but often segregations in the feed produce like segregations and variations in the finished product, although they are less marked. It is certain, however, that the more complete and uniform the mixture of the clinker and gypsum, the more uniform will be the SO_3 in the finished cement.

Mechanical Feeders

All mechanical feeders may be divided into two general classes, those which measure the gypsum by weight and those which measure by volume. There are only a few types of feeder which actually weigh the gypsum, but there are a great many volumetric type feeders. Where a volume method for proportioning the gypsum is employed there is danger that the weight will not be the same with the fine gypsum as with the coarse, although the volume may be the same. There is, of course, this objection to volume mixers, that any difference in the physical condition of the gypsum affects the weight of the latter. On the other hand, gypsum is seldom obtained dry, which means that where the proportioning is done by weight the variations in the moisture in the gypsum will affect the proportions. The following classification will cover, at least in principle, most mechanical gypsum feeders:

Weighing Feeders

Belt Type—Examples: Schaeffer poidometer; Richardson scale, belt type.

Hopper Type—Example: Richardson scale, hopper type.

Volumetric Feeders

Rotary Table—Examples: International Cement Corp. feeder; Polysius feeder; Bradley Pulverizer Co. feeder.

Reciprocating Pan

Screw—Example: J. C. Buckbee Co. feeder at Dewey, Portland Cement Co. plant, Davenport, Iowa.

Star or Vane; Belt or Pan; Drag Chain.

Schaeffer Poidometer

The Schaeffer Poidometer Co.'s device, the poidometer, is a weighing belt type of feeder used in many industries where accurate proportioning of mixtures of various materials is important. In cement plants it is used for feeding and proportioning both gypsum and clinker. The construction and method of operation of this device are indicated in the sketch, Fig. 2. It consists essentially of a short conveyor belt provided with a weighing device so that the load on the belt is balanced by a graduated lever weighing arm. Above the receiving end of the belt is a feed hopper from which the flow of material to the belt is controlled by an adjustable gate. To the gate is attached another lever arm connected with the weighing lever. The weight on the weighing lever arm is set to balance the required load on the belt. If the load passing over the belt exceeds the desired amount the weighing lever actuates the gate lever, partly closing the gate and allowing less material to pass out on the belt. If the load becomes too light the hopper gate is automatically opened. In this way a balance is established so that the desired amount of material is continuously and uniformly drawn out on the belt.

The poidometer is made in several different sizes and ordinarily the smallest size is used for the gypsum, while a larger size is used for the clinker. The smallest size, however, sometimes gives some trouble when feeding gypsum as it is ordinarily sized. The feed hopper opening is so narrow that long slivers of gypsum or pieces of wood (from car floors, etc.) arch across it and stop the flow of material. Another difficulty is that unless the feeder is run at a very slow speed the sliding hopper gate is set so close to the belt that pieces of gypsum as large as 1½ in. in diameter cannot pass under it. Gypsum used in this feeder must be very carefully sized so as to contain no large lumps.

Richardson Scales

The Richardson Scale Co. makes two types of weighing and proportioning devices used for gypsum and cement clinker. The older

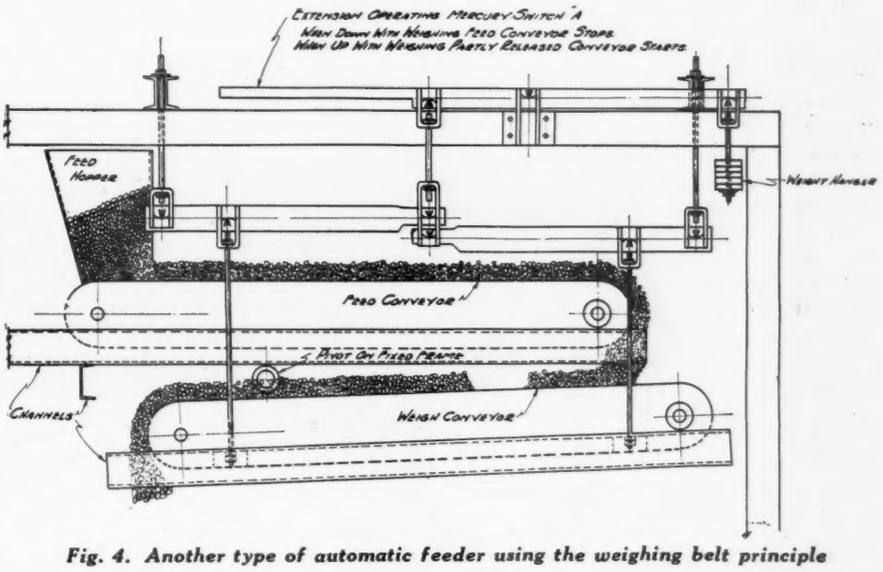


Fig. 4. Another type of automatic feeder using the weighing belt principle

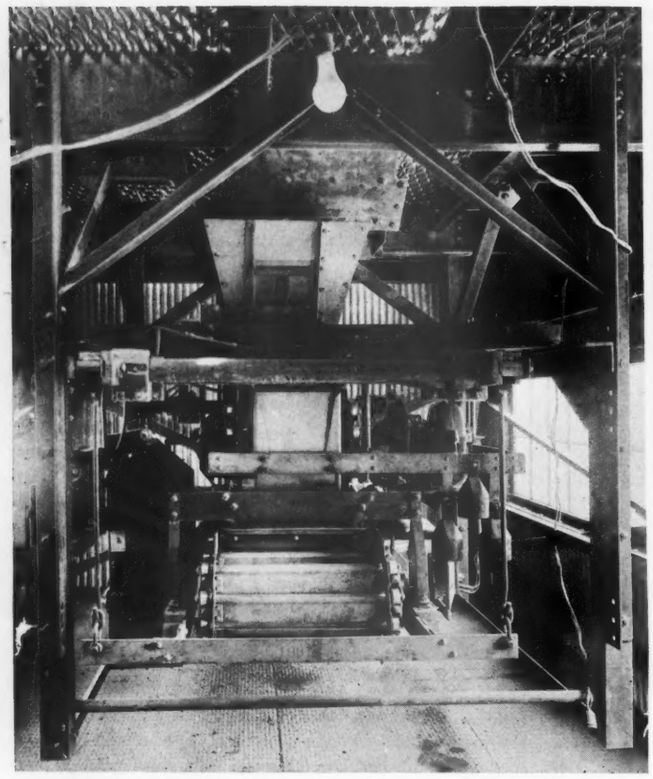


Fig. 3. Installation of an automatic weighing machine at the plant of the Valley Forge Portland Cement Co.

type, which has been in use for a number of years, consists essentially of a suspended weighing hopper in connection with an adjustable weighing arm on which weights may be placed to balance any desired weight in the hopper. The material to be weighed is brought up by a belt conveyor and dumped into the hopper. When the desired weight is reached the scale trips, stopping the feed belt and opening a discharge gate in the bottom of the hopper. As soon as the weighed load is discharged the gate closes and the feed belt is again started automatically. A large hopper scale is used for the clinker and a small one for the gypsum, and the operation of the two scales is synchronized either electrically or mechanically so that the two discharge at the same time.

This is a very good device in that it gives exact and easily adjusted proportions and any size of gypsum or clinker may be used in it. There are no narrow spouts or gates to obstruct a free flow of materials. Its chief disadvantages are the amount of head room required for the large clinker hopper and the fact that the gypsum and clinker are discharged in large batches intermittently, rather than in small amounts continuously, as has been previously stated, is the preferable way.

These two difficulties have been overcome in their new type, convey-o-weigh, in which weighing belt conveyors are substituted for the weighing hoppers. The principle of operation is shown in the sketch, Fig. 4. It consists essentially of two pivoted, balanced belt or pan conveyors, a lower or weighing conveyor and an upper or feed conveyor. The material to be weighed is received in a feed hopper on the upper conveyor and fed out in a uniform stream on this conveyor, from which it discharges to the weighing conveyor. The weighing conveyor continues to receive the material until the predetermined weight is resting on it; then it swings down, breaking contact in a mercury switch *A* and stopping the feed conveyor. The weighting conveyor, however, continues in motion and begins to discharge its load. As soon as a small part of the load is discharged, the conveyor swings up again, making contact in the switch and starting the feed conveyor again. Thus the weighing conveyor discharges almost continuously, but each charge is weighed separately and separated on the belt from the next succeeding charge by a small interval (Fig.5).

The upper or feed conveyor is also pivoted and balanced so that when the hopper is kept full or has enough in it to complete a weighing, the whole system functions as explained above. But if the feeding system is not adequately supplied, the feed conveyor swings up, breaking contact in mercury switch *B* and stopping *both* conveyors. Thus accurate and complete weighings of all material discharged from the system are assured.

The amount of each weighing on the weighing conveyor can be regulated by placing detachable weights on the lever arm which balances this conveyor.

The two conveyors may be placed at any angle with each other, so that it is easy to fit them into an already existing plant.

Clinker and gypsum scales may be so arranged that the gypsum will be spread out in a uniform layer over the top of the clinker stream on the belt. This feeder will handle gypsum up to 2 in. or more in diameter and feed it in a uniform, continuous, weighed stream, and is quickly and easily adjustable.

At the cement plant of the Michigan Alkali Co. (Wyandotte), at Wyandotte, Mich., a small hopper type Richardson scale is used for gypsum in conjunction with a Merrick weightometer for the clinker. The clinker, carried in a continuous pan conveyor, is weighed by the weightometer. As each 1200 lb. of clinker passes this machine a small shaft is turned one complete turn. This actuates an electric switch on the gypsum scale which is located a short distance away over the clinker conveyor. The gyp-

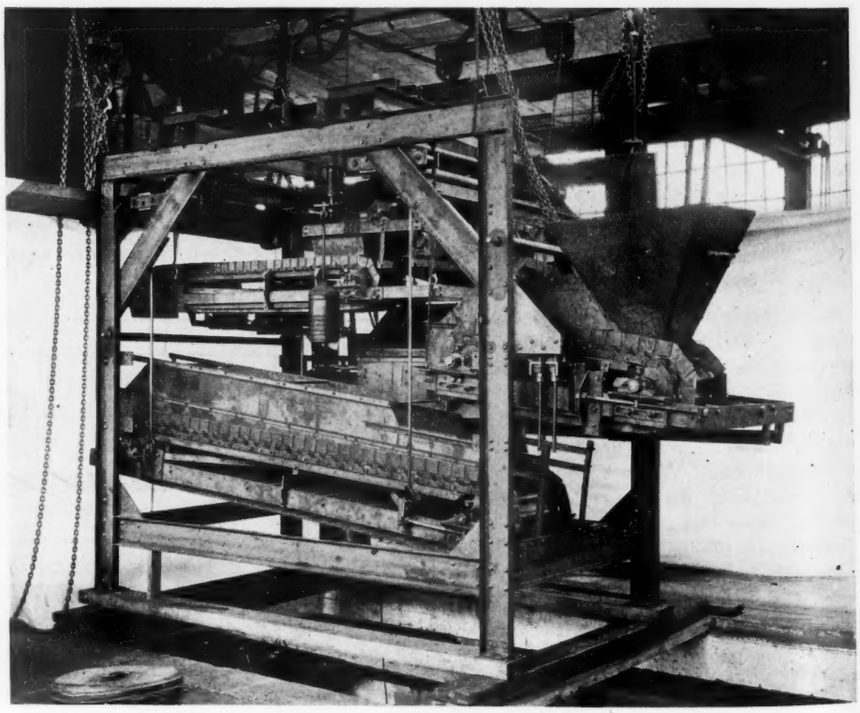


Fig. 5. Automatic scale for weighing and proportioning material, showing weight belt

sum is fed into the hopper of the scale by a belt conveyor. The conveyor is started by the electric switch noted above and continues to run until the predetermined weight of gypsum is resting in the hopper of the scale. The lever arm then tilts, breaking the circuit, stopping the feed conveyor, and discharging the gypsum in the hopper on the clinker conveyor below. As soon as it is discharged the hopper closes and is ready to receive the next charge as soon as the next 1200 lb. of clinker passes the weightometer.

When first installed the gypsum scale worked as described, but it had the fault of dumping the gypsum in single batches instead of continuously. This gave an irregular, spasmodic feed and sometimes overflowed the clinker bucket at the dumping point. These faults were overcome by placing a small shaking pan feeder below the scale weighing hopper. After the hopper dumps the gypsum is fed out slowly and uniformly over the clinker in the pan conveyor passing along underneath. This does not give a completely continuous feed but nearly so, as there are but very brief intervals between weighings when the shaking feeder has nothing to feed. This system is very satisfactory and gives accurate results with little or no trouble.

Rotary Table Feeders

The rotary table feeder, in various forms, has been used for many years and for many types of materials. In recent years it has been specially developed for use in cement plants, until today it is one of the most efficient if not the most efficient of all of the volumetric types of feeders used for feeding clinker and gypsum to grinding mills. The International Cement Corp. uses this type of feeder, developed by themselves, in nearly all of its plants, and today considers it the best type of feeder they can use. Through the courtesies of that company the author was furnished with detailed blueprints and data for the preparation of this description.

The International table feeder is shown in an outline sketch in Fig. 6, which shows both the clinker and the gypsum feeders. These two feeders are identical, but, of course, are run at different speeds. Each feeder consists of a vertical shaft, the lower end set in a bearing and the upper end terminating in a flat, round table. Power for turning the table is supplied through a horizontal shaft and a bevel gear meshing with a gear on the table shaft. Attached to the housing of the table top is a stationary scraper set close to the top of the table and extending from the rim in toward the center. The angle which the scraper makes with any radius of the circular table is adjustable so that, as the table revolves, a greater or lesser proportion of the material on the table is scraped off. In the sketch given the clinker table is driven by a motor, through a speed reducer, and the gypsum table is driven from the clinker table shaft, through a second speed reducer. The speed of the gypsum table is usually about one-twentieth (1/20) of the speed of the clinker table. Motor, shaft and table speeds are given in the sketch.

Gypsum is delivered to the table from a bin system above, shown in Fig. 1 and described on page 75. The lower end of the smaller bin terminates in a cylindrical feed pipe 12 to 14 in. in diameter. Around the outside of this pipe is a slightly larger pipe which slides up and down upon it, so that the lower end of the outer pipe can be fixed at varying heights above the table top. A

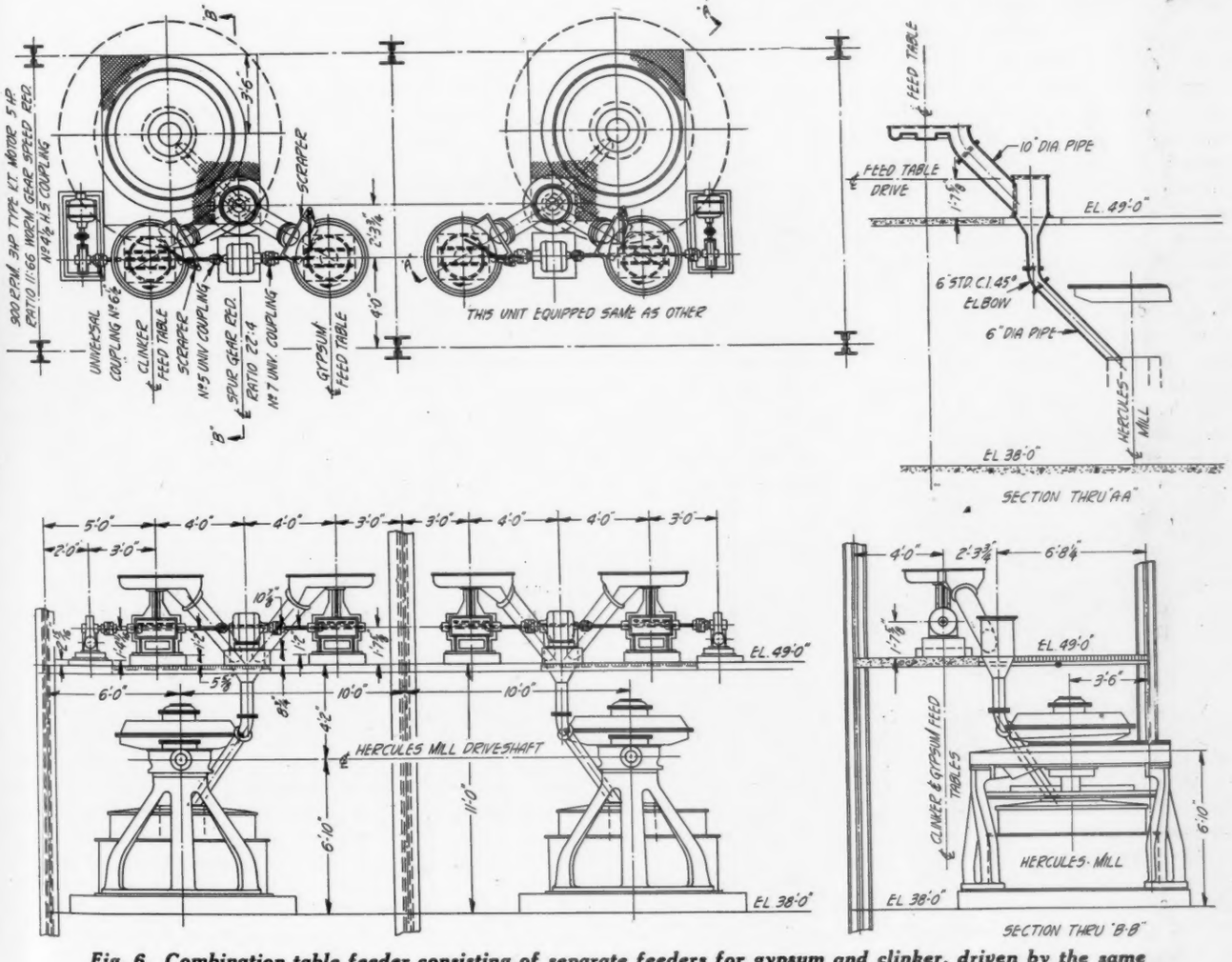


Fig. 6. Combination table feeder consisting of separate feeders for gypsum and clinker, driven by the same motor through speed reducers

yoke passes around the outer pipe and is pivoted to it. One end of the yoke is attached to a fixed pivot and the other end terminates in a lever arm, by which the yoke carrying the outer pipe may be raised or lowered. The lever arm slides up and down between vertical guides in which are a number of holes at regular intervals.

By means of the lever arms the outer pipe is set at the proper height above the table and the lever is there held in place by putting a pin beneath it through one of the sets of holes in the vertical guides.

The amount of gypsum on the table at any one time depends upon the height of the feed pipe above the table and the angle of repose of the gypsum which flows out below it. By adjusting the sliding feed pipe and the angle of the scraper, the amount of gypsum being fed may be regulated within narrow limits. After the gypsum and clinker are scraped from the table they fall on the same conveyor and are carried on to the clinker grinding mills together. Once the clinker and gypsum feeders are properly adjusted, the gypsum content of the finished cement is maintained with great uniformity.

In some installations the feeder motor is electrically synchronized with the grinding mill motor so that if the grinding mill slows down or stops, the feeding of clinker and gypsum also slow down or stop.

This feeder will handle successfully crushed rock up to 1½ in. in diameter or even larger. It is not clogged by stray pieces of wood or occasional long slivers of gypsum, as are some types of feeders. Damp fines, if not in excessive amounts, give no trouble. Probably large amounts of very dry fines would flood out over the table, but this feeder is not designed to feed dry fines alone, and this difficulty is common to most feeders not specifically designed for dry fines.

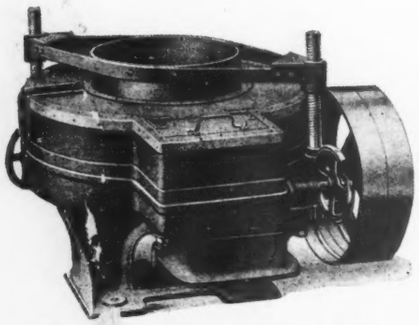


Fig 7. Completely enclosed table feeder

It is best to use a variable speed motor when both the clinker and gypsum tables are driven from the same motor, as in the sketch. If the clinker becomes a little more difficult to grind and it is necessary to reduce the rate of clinker feed to the tube mill, this can only be done by changing the adjustment of the clinker table if a fixed speed motor is used. The adjustment of the gypsum table feeder must also be changed proportionally, if the same amount of SO_3 in the cement is to be preserved, and this may sometimes be overlooked. With a variable speed motor on the feeder system the feeding rate of the clinker and gypsum may be varied simultaneously and proportionally.

In some cement plants the table feeder is used for gypsum alone and the clinker is fed by some other device. In such cases other means of synchronizing the two feeders must be used. Sometimes the gypsum table feeder is run continuously as described above; sometimes the table is turned in short strokes at regular intervals (as at the Dewey plant at Davenport, Iowa); and sometimes it is so arranged that the table at regular intervals makes one complete revolution and then stops (as at the Knickerbocker Portland Cement Co. plant at Hudson, N. Y.). It is impossible to give the details of all the methods of driving and synchronizing used in different plants, but many types of electrical and mechanical devices are used.

The International type of feeder or one closely resembling it is now made by the Bradley Pulverizer Co., Allentown, Penn.

The Polysius Corp. makes a table feeder which differs considerably in appearance from the International feeder, but its principle of operation is about the same. The feed table is enclosed in a housing which prevents dusting, but it has the disadvantage that the gypsum being fed is not in plain sight all the time (Fig. 7).

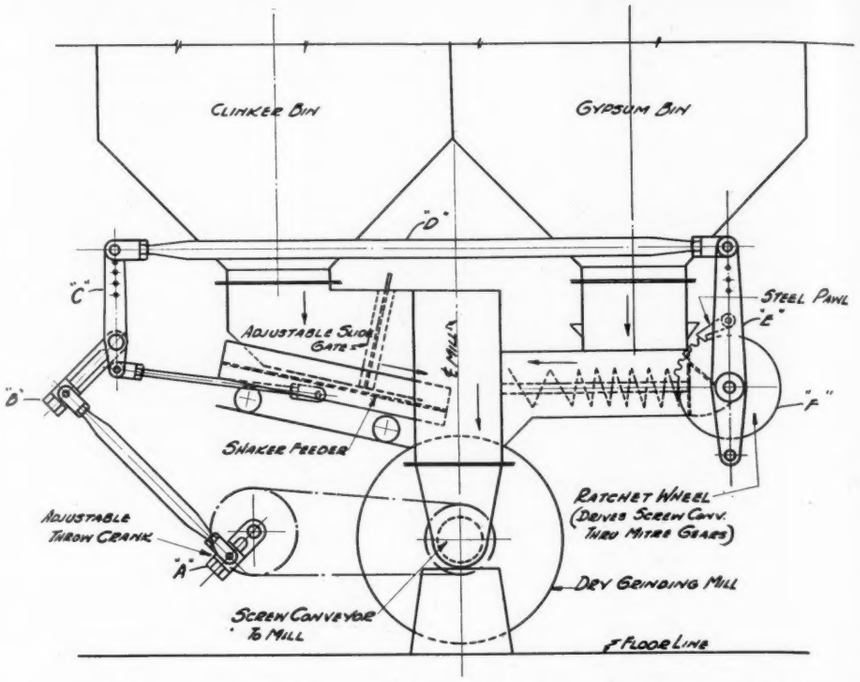


Fig. 8. A screw feeder used in connection with a shaking pan feeder

Reciprocating Pan Feeders

The shaking pan type of feeder has long been in use by many industries, but it is used as a gypsum feeder by but few cement companies today. Its method of construction and operation is so well known and so simple that a detailed description here is hardly worth while. Fig. 8 shows in outline the shaking pan feeder used for clinker by the Dewey Portland Cement Co. at Davenport, Iowa. This feeder is not well adapted to the uniform feeding of small amounts of material, particularly gypsum. The amount of material discharged cannot be controlled as accurately as with some other types of feeders. Furthermore, if the gypsum contains many dry fines it is liable to flow freely and flood out over the lower lip of the pan in an uncontrolled stream.

Screw Feeders

The ordinary screw conveyor has sometimes been used for feeding gypsum, but only specially designed types of this conveyor are successful as crushed gypsum feeders. At one plant an ordinary screw conveyor, 6 or 8 ft. long, was tried out, but was soon discarded. It was not built heavily enough to handle rock up to 1½ in. in size. The pitch of the screw was not right and it was too long. Moist gypsum packed in the conveyor trough gradually forced the screw up in the center until it was bent out of line and finally broken.

A specially designed screw feeder, however, is in successful use in the Dewey Portland Cement Co. plant at Davenport, Iowa This was designed by the J. C. Buckbee Co., of Chicago, to whom the author is indebted for data and sketches. This feeder, shown in outline sketch in Fig. 8, is used in connection with a shaking pan feeder for the clinker. The general features of construction and operation are shown in the sketch. The screw is 9 in. in diameter by about 3½ ft. in length, and is mounted on a

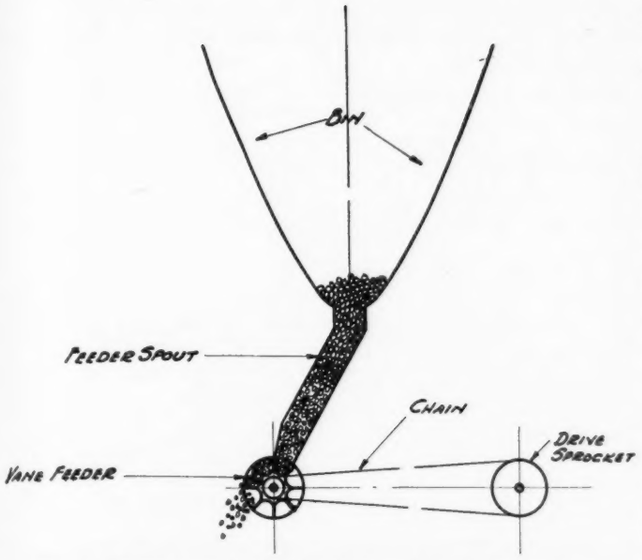


Fig. 9. Drum-type feeder having pockets in its surface to provide the uniform supply of material

2½-in. pipe. The screw pitch is 4 in. in the section under the gypsum hopper, but about twice that in the discharge section beyond, to insure free discharge. The gypsum and clinker feeding mechanisms are driven from an extension of the tube mill shaft through sprockets and a chain, through adjustable throw crank arm *A* and *B*. A variable throw, shaking motion is imparted to the clinker pan feeder at the left, which receives its supply of clinker from a hopper above, through a chute with a sliding steel gate.

Through the same cranks *A* and *B* motion is also imparted to crank *C* and through reach-rod *D* to crank *E*, to which are attached steel pawls which turn ratchet wheel *F*. Motion is then imparted to the screw conveyor through bevel gears attached to the ratchet wheel and conveyor shafts.

This system synchronizes mechanically the speed of the tube mill and the flow of clinker and gypsum. The speed of feeding both gypsum and clinker can be regulated through a wide range by means of the adjustable cranks *A* and *B* Reach-rod *D* can be adjusted to about six different positions at each of its two end connections with crank arms *C* and *E*. Thus the relative rates of feeding of gypsum and clinker can be varied widely and when once fixed will continue automatically without any attention.

The gypsum and clinker fall together in a continuous stream and are conveyed directly into the tube mill.

This system seems to work satisfactorily and looks very good. Its chief disadvantages are the amount of space it requires and its cost.

At this same plant a table feeder for gypsum, resembling the International table feeder, is also being tried out. It is used in connection with the shaking-pan, clinker feeder described above, and is actuated in the same way, by the same system of cranks and reach-rod.

Star, Vane or Drum Type Feeder

This feeder consists essentially of a cylindrical drum revolving on a horizontal shaft (see Fig. 9). In the surface of the drum are pockets extending clear across its full width. In some cases these pockets are fairly shallow and in other cases they go nearly to the center of the drum and are so closely spaced that the partitions separating the pockets are mere vanes. The whole circumference of the drum is usually divided into four to eight equally spaced sprockets. This drum is mounted in a housing at the bottom of a chute or spout so snugly that the stream of gypsum from the spout can just fill the pockets and any surplus is held back. The front or lower side of the drum is open so that the gypsum can spill out of each pocket in turn as the drum revolves. The drum may be revolved continuously at a slow speed or it may be driven from a crank with a ratchet and pawl device, so that it turns in short, intermittent strokes. With the crank arrangement there is usually provided an adjustable arm so that the length of the stroke, and consequently the speed of rotation, can be varied within wide limits.

This feeder in various forms and modifications is widely used not only for feeding gypsum but also for all sorts of materials. Its advantages are small size, low cost, ease of adjustment, and small power requirements. It is best adapted to closely and uniformly sized, dry rock, free from fines. Its chief disadvantage is that if the rock contains any appreciable amount of damp fines these fines tend to pack in the pockets and build up a layer of gypsum which gradually reduces the capacity of the pockets. Cases have been known of the SO_3 in the finished cement dropping 50% due to this cause. If this feeder is properly designed and properly operated and the gypsum never contains any moist fines, it is satisfactory. But perfect conditions cannot always be maintained.

One company operating feeders of this type have found them unsatisfactory on dry fines. The feeders are set on the ends of spouts leading almost vertically from large storage silos. Dry fines sometimes flow and flood almost like water, and if the drum housings are not tight (due to design or wear) the fines flow by the vanes and get out of control.

The Bethlehem Foundry and Machine Co. of Bethlehem, Penn., manufactures a feeder of this type used to a considerable extent in the Lehigh district. Fig. 10 shows one of these feeders used in connection with a rotary clinker weighing hopper. The pockets in this feeder are removable so that various sized pockets can be used.

Continuous Belt or Pan Conveyor Feeder

The ordinary belt or steel pan conveyor is sometimes used as a gypsum feeder. It is usually placed beneath a bin or hopper and the amount of gypsum carried by the belt is regulated by opening or closing a gate either in the spout from the hopper to the belt or fixed over the top of the belt in such a way that it allows the belt to pull out only a layer of definite thickness on the belt. If the conveyor is run continuously, its speed may be regulated by various devices such as variable speed drives, cone pulleys, adjustable crank arms, etc. Sometimes the drive is intermittent and the conveyor is moved forward short distances at regular intervals by various devices, often connected in some way with the driving mechanism of the grinding mill.

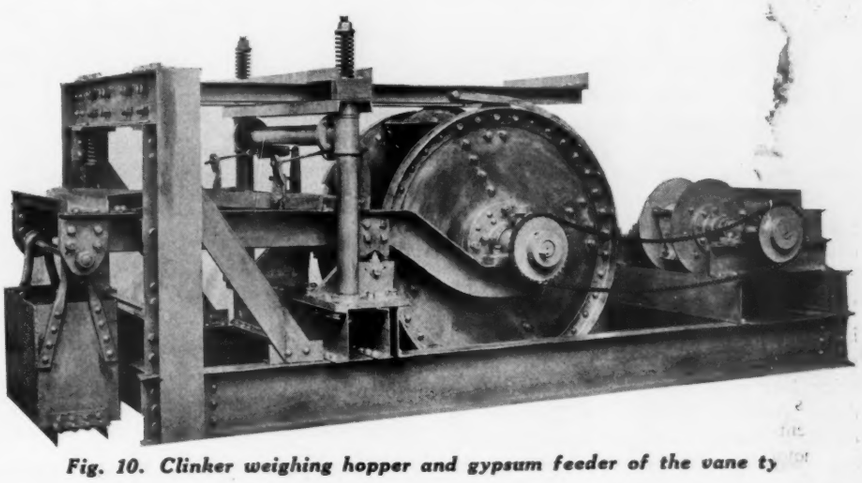


Fig. 10. Clinker weighing hopper and gypsum feeder of the vane ty

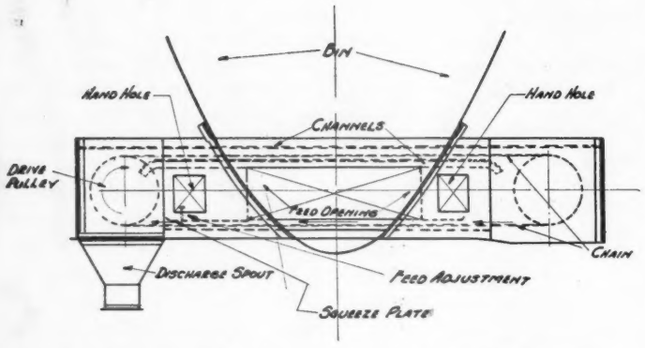


Fig. 11. A cross-section of a typical drag chain feeder

Usually feeders of this type are built at the cement plants, and all sorts of ingenious mechanical and electrical devices are used to control the speed or capacity of the feeder No two are alike. When properly designed and carefully operated, they are fairly satisfactory, but usually they are not very efficient. Sometimes they are of such heavy construction that they are very insensitive and do not do nearly as accurate work as hand feeders.

The Merrick Scale Manufacturing Co. of Passaic, N. J., make a gypsum feeder called the Merrick gypsum proportionate feeder. It is used in connection with the Merrick conveyor-weightometer for clinker. It is essentially a continuous pan conveyor fed from a hopper above through an adjustable gate. The amount of gypsum on the conveyor is regulated by the setting of the hopper gate. The conveyor is electrically driven and its speed is regulated by a synchronizing device electrically connected with the weightometer. As the amount of clinker passing over the weightometer belt varies, the speed of the gypsum feeder varies proportionally, so that the same percentage of gypsum is always uniformly and continuously added to the clinker. The gypsum feeder discharges on the clinker conveyor after it passes the weightometer.

Drag Chain Feeder

This type of feeder has not been encountered by the author in any cement plant as a gypsum feeder, but as it is used quite extensively for feeding gypsum in gypsum mills it will be described here briefly. It is possible that it might be adapted for use in cement mills.

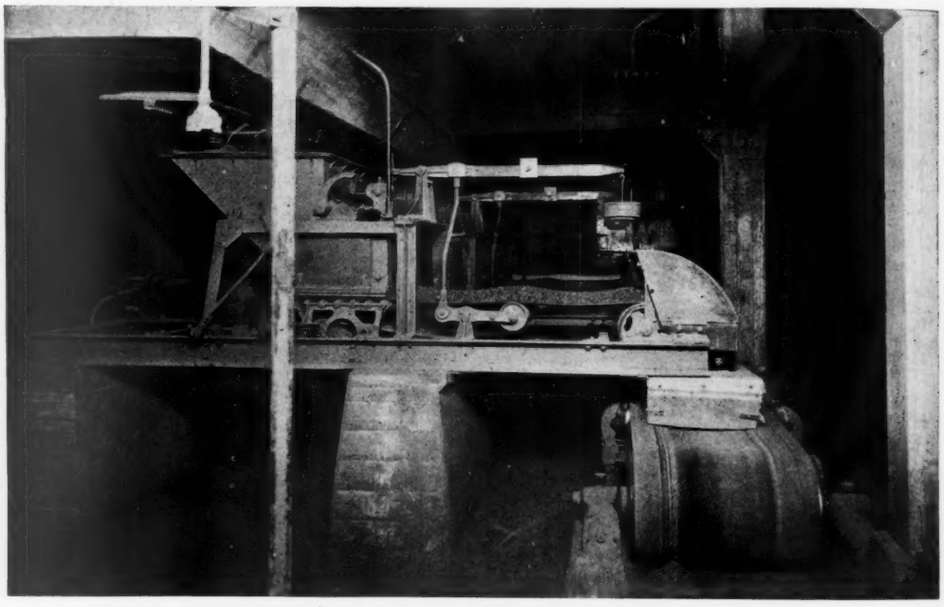
A typical drag chain feeder is shown in Fig. 11. It consists essentially of a chain built up of large square links with high sides, each link being virtually a small measuring box without any bottom. The chain drags along the bottom of a V-shaped, or elliptical bottom, either longitudinally or crosswise, passing out under a "squeeze-plate" which strikes off the load in the chain links level full. As soon as each link passes beyond the end of the bin the gypsum drops out of the box-shaper link on a conveyor which carried it to the grinding mill. The amount of gypsum fed can be regulated by varying the speed of the chain by suitable means and by changing heights of the squeeze plate.

The advantages of this feeder as as follows: The links are self-cleaning and there are no pockets in which damp fines can pack. There are no feed spouts in which the gypsum can pack and clog. By passing through the bottom of the bin itself each link is sure of receiving a full load as long as any gypsum remains in the bin. It will work equally well on dry or damp rock.

The disadvantages are: Considerable power is required to pull the chain through the large mass of gypsum. Fairly fine screened rock must be used in order to get accurate measurement in small link chain, and in order to pass successfully under the squeeze plate. Special bin construction is needed.

While this type of feeder is being used successfully on crushed gypsum, both dry and damp, in large capacity units, it would have to be specially redesigned and adapted to the small capacities needed for cement plant use.

Where run-of-crusher gypsum or screened rock is employed, the opening from the gypsum bin to the feeding device should be large. This means that if a pan or table feeder is used, the latter will have to move quite slowly. It is preferable, therefore, to have a large opening and in the case of small mills move the feeder a few inches at a time and then stop by some form of ratchet and wheel rather than attempt to gear the feeding down so that it moves slowly. A pan feeder which moves forward a few inches at each impulse, at a fairly rapid rate, will be fed more uniformly and there is less likelihood of its sticking than is the case with a very slow-moving feeder.



Weighing proportioner described on page 77 installed in a cement plant

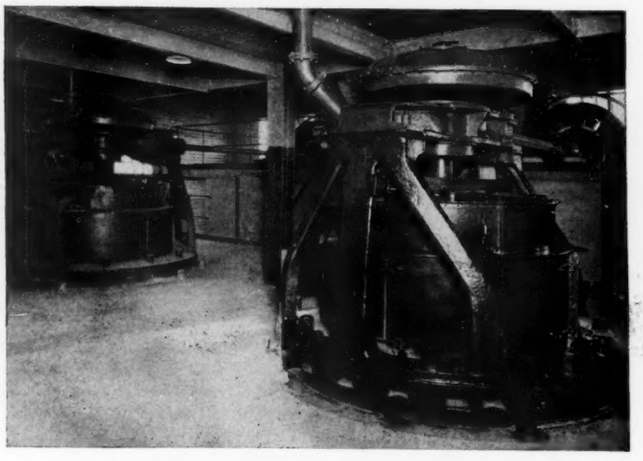


Table type feeder used by International

Gypsum Products Makers Protest New Tariff on Crushed Gypsum

Hearings at Washington, D. C., July 20 and 21

THE GYPSUM TRADE since its establishment has recognized a "fundamental" difference between crushed gypsum and ground gypsum, a representative of the United States Gypsum Co. stated July 20 at a hearing held at the Bureau of Customs on the Bureau's order to transfer gypsum from the free to the dutiable list.

The hearing was called by the Bureau to permit importers of crushed gypsum to present reasons for revocation of the order and domestic producers to show why the duty should be applied to the product. (The full text of the order of the Bureau of Customs was published in ROCK PRODUCTS of June 23, 1928.)

The first day of hearings was devoted to the testimony of the United States Gypsum Co., with head offices in Chicago. This company, as its officials explained to the commissioner, imports gypsum from its own mines in Nova Scotia and processes it in various factories throughout the country.

The decision against which the importers of gypsum have protested directed the classification of crushed gypsum in the same category as ground gypsum, and so made it dutiable under Section 205 of the Act of 1922. Instructions directing collectors of customs to begin assessment of duty upon imports of gypsum, crushed after being quarried, have already been issued by the Bureau of Customs, according to an announcement made on June 13 of this year by the commissioner of customs, E. W. Camp.

It was the purpose of the commissioner of customs to establish in the present hearing, first, whether any fundamental difference can be detected between crushed gypsum and ground gypsum; second, whether there is any observable distinction between crushed gypsum and crude gypsum; and, third, what amount of processing, claimed by the importers to be necessary before the imported gypsum is in a shape sufficiently satisfactory for shipment, must take place before crude gypsum admitted free of duty under the provisions of the Act of 1922, becomes ground gypsum, dutiable under the provisions of the same act.

The fundamental difference between crushed gypsum and ground gypsum, it was stated by the companies' representatives, lies in the process involved. Crushed gypsum is gypsum which has not yet passed through burr mills which grind it fine and make it fit for use by manufacturers of plaster. It is gypsum which has merely been taken from the face of the quarry by some modern method such as steam-shoveling and loaded into cars or on conveyors, and then loaded into boats for shipment to the United States. The company's officials insisted the processing was only sufficient treatment to render the gypsum fit for shipment.

As to whether any distinction could be drawn between crushed gypsum and crude gypsum, it was explained by the company's representatives that all gypsum which had not been calcined or ground might be defined as crude. To the question whether they could fill an order for crushed gypsum, they answered that they must first know what sort of crushed gypsum was required, just as they must know what specific trade category of gypsum was desired by the purchaser when they received an order for ground gypsum.

It was further maintained by the United States Gypsum Co. that most of the discussion of the difference between ground and crushed gypsum had little bearing upon the import of their product, which arrived in this country in such state that it could not conceivably be used by manufacturers without further processing. It was therefore, by the definition laid down in previous tariff cases, in the category of crude gypsum, a raw product which remained to be manufactured in the United States.

Exhibits of the gypsum belonging to the United States Gypsum Co. were shown to the commission, together with markings showing the amount of crushing and grinding which had been employed in bringing the product to that stage. It was contended that crushed gypsum could be readily differentiated from ground gypsum because of the different treatment which they had undergone, the ground product being more or less finely pulverized rather than merely broken up.

These exhibits were declared to be samples taken from the various classes of gypsum with which the company supplies consumers. Such classifications as it observes are, it maintains, the classifications in use throughout the industry, and established by long usage and much discussion on the part of the trade.

Reference was made to two articles appearing in ROCK PRODUCTS in 1924. The first of these articles, by Warren Tyler, defines crushing and grinding very carefully, and establishes that though there have been numerous attempts on the part of certain consumers of gypsum to have a system of numbers applied to the grading of the products, the industry has resisted because it believes in the fundamental value of the differentiation between crushed and ground gypsum. The second, also by Warren Tyler, enlarged upon these definitions.

Freight rates, established by the railroads, are specifically laid, the United States Gypsum Co. declared, on the two kinds of gypsum, separately. Crushed gypsum is shipped at the same rates as crushed limestone, a rate for crude stone, whereas ground gypsum is shipped at a much higher rate as a finished product.

Specifications for classes of gypsum, as established by the American Society for Testing Materials in 1925, "determine" that crushed gypsum is not ground gypsum, Frederick Thompkins, president of the Newark Plaster Co., told the commissioner of customs, E. W. Camp, July 21, at the closing session of the hearings conducted by the Customs Bureau on its order to transfer crushed gypsum to the class of dutiable ground gypsum.

Mr. Thompkins said the Society for Testing Materials divided gypsum into four main classes: Run-of-mines gypsum, crushed (run-of-mine further reduced), sized (gypsum of about ¾-in. size), and ground (pulverized for specific uses). He added that the Bureau of Standards had stated that it observes the specifications laid down by the Society. This seemed to prove, Mr. Thompkins declared, that crushed gypsum was officially as well as industrially accepted as being something specifically different from ground gypsum.

Standards Used Since 1921

Judge H. R. Rippey, counsel for certain domestic companies desiring the duty on ground gypsum, asked how long these specifications had been in force in the Newark Plaster Co. Mr. Thompkins answered that the specifications had been employed since 1921, when his company left off manufacturing in Canada, or about a year before the imposition of the present tariff of 1922. It was at this time that they resumed shipments to the United States of crushed rock, and to facilitate shipments they installed crushers in their Canadian quarries to reduce the rock to a minimum size of ¾ in.

Martin McUldold, president of the Standard Gypsum Co. of California, told the commissioner that his company had invested more than $1,000,000 in the gypsum business after the Tariff Act of 1922 had come into effect, but only after being assured by inspectors of customs that the tariff on crushed gypsum could not apply to crushed gypsum which his company imports from Mexico.

If the recent ruling by the commissioner were allowed to stand the Rutland Fire Clay Co. would probably be forced out of business, declared James L. Gary, counsel for that company. He explained that his company depended upon Nova Scotian deposits exclusively for its supply, and had been assured by customs officials of the safety of their position as importers of Nova Scotian crushed gypsum duty free.

Similar Controversies Cited

The use of the word "crude" in the Tariff Act of 1922 was cited as representing an article "crushed but not pulverized," and a "crude mineral substance not advanced in value by manufacture." The cases of disputes arising from this tariff were reviewed, and the instance of molybdenite was given, wherein the court ruled that it was an article "in a state of nature, and so not dutiable," and the case of limestone, in the Lackawanna Steel Co. case, when it was decided that the material had been "reduced to size merely for transportation, not dutiable."

The gypsum industry has had a trade organization in which specifications are laid down for the whole industry, the commissioner was told by L. I. Neale, sales manager of the Atlantic Gypsum Co., of New York City. On this committee, were represented producers, consumers and unattached specialists from such bodies as the Bureau of Standards and the Bureau of Mines, he said. At their meeting of June 27, 1926, the committee established a three-fold separation of gypsum into lump, crushed, and ground. In 1925 the specifications laid down by the American Society for Testing Materials were accepted as the standard for the industry by the committee, Mr. Neale stated.

The reports of the Department of Mines, Government of Nova Scotia, previously cited by the commissioner in his ruling on the transfer of crushed gypsum from the free to the dutiable list, were read into the minutes of the hearing by Judge Rippey, counsel for certain domestic producers who preferred to remain anonymous. It was further requested by Judge Rippey that testimony of S. L. Avery, president of the United States Gypsum Co., given in 1908 and 1909, be read into the record. According to Judge Rippey, Mr. Avery, who appeared before the commissioner of customs on July 20, 1928, to urge that the duty should not be enforced, had appeared before the Ways and Means Committee to beg that the duty then to be imposed of $1 be put into effect because it was not prohibitive, and had urged that the quality of Nova Scotian gypsum was inferior.

At the close of the testimony of Judge Rippey the commissioner declared the hearing closed and ordered all briefs for both parties to be in his hands two weeks after the completion of the records of the hearing. —*United States Daily.*

R. P. Butchart Honored by Home City

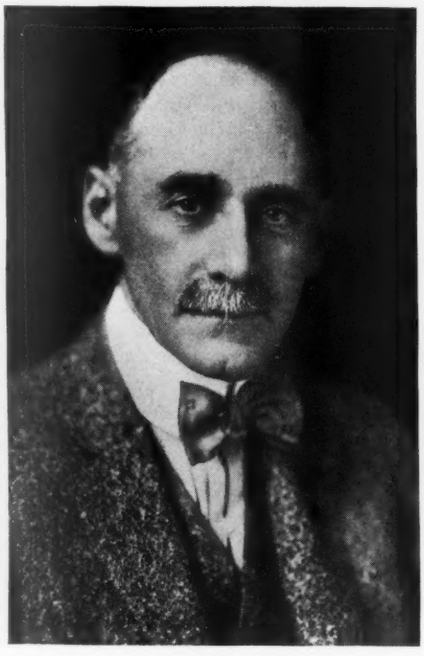
IN HONORING R. P. Butchart by creating him a Freeman of the City of Victoria, B. C., tribute is paid by the city of Victoria and the municipalities of Oak Bay, Saanich and Esquimalt to the oldest cement manufacturer alive in Canada or the United States today, and perhaps the father of the cement business in Canada.

The ancient ceremony of creating a Freeman of the City, borrowed from England, and for which the capital city of British Columbia had to secure special legislative powers, was performed at the city hall, Victoria, June 22. Mr. Butchart signed the roll of freemen, his name being the second to be written in the special parchment book kept for that purpose. His Excellency the Governor General, Viscount Willingdon, was the first to be created a freeman, the honor being conferred upon him when he visited Victoria last year.

Accompanying the highest civic honor the city and the surrounding municipalities have power to award to Mr. Butchart an illuminated address and key was presented in an engraved silver chest.

Famous Gardens

Recognition of the public spiritedness of Mr. and Mrs. Butchart in throwing open their wonderful gardens at Benvenuto to the thousands of visitors from all parts of the world, as well as Canada and the United States, who visited Vancouver Island during the past years, prompted the honor to be conferred. The 25 acres of gardens, lawns and flowers have charmed a million or more people since the unsightly quarries and sursoundings which followed in the wake of cement manufacture have been transformed into one of the most beautiful scenes on the American continent. Great expanses of velvet green lawn, bordered by wonderful rose trees, cover part of the site of former manufacturing operations. Flowers and more flowers beautifully blended and planted so that there is a riot of color at any time of the year now cover other spots which once marred the beauty of the landscape and last but not striking are the sunken gardens which have been created in the quarries from which lime, rock and clay for making the cement was dug. Not only has this delightful venue been open to the public at all times but generous hospitality of Mr. and Mrs. Butchart has been extended to thousands of visitors even when it has meant the entertainment of numbers of convention delegates, and no convention in Victoria is complete without a visit to Benvenuto.



R. P. Buchart

Active Business Life

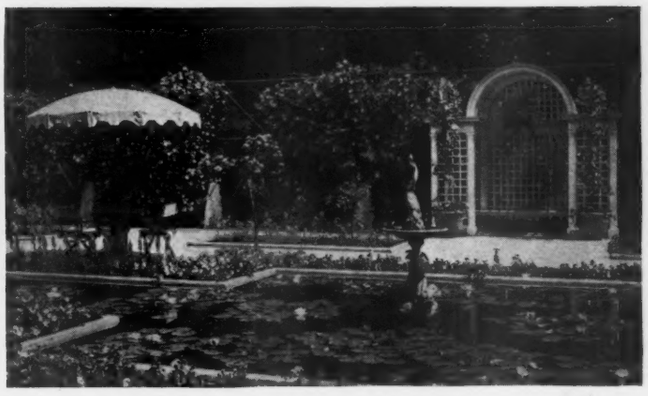
Although Victoria and its neighboring municipalities honor Mr. and Mrs. Butchart mainly as an appreciation of the courtesy they have extended to citizens and tourists through their gardens, the Dominion of Canado owes him a debt of gratitude, too, in establishing throughout Canada the cement industry which has revolutionized building. In an active business life which has embraced many lines of industry Mr. Butchart's name stands out most prominently as a cement manufacturer.

Born in Owen Sound, Ontario, in 1856, Mr. Butchart started his working days as a hardwareman. At the age of 18 he joined his father, Captain G. M. Butchart, who later opened three or four stores in the northwest. As is often the case, Mr. Butchart was virtually forced into the business in which he afterwards became an outstanding figure, although he early showed that he had that sound judgment and business ability that would undoubtedly have carried him to the top of the tree in any other line of endeavor. It was the probable loss of money already invested in the then comparatively new cement business that led him to start the first portland cement mill in Canada near Owen Sound in 1888. His determination was rewarded with success. With the Owen Sound Portland Cement Co. well established, Mr. Butchart, with a few friends as partners, set about the establishment of the Lakefield Portland Cement Co. at Lakefield, Ont., with equal success followed by the establishment of another plant of that company in Montreal, now owned by the Canada Cement Co., being the largest in Canada, with a production of 12,000 bbl. a day. It was in 1904 that Mr. Butchart came to British Columbia and started the Tod Inlet plant of the Vancouver Portland Cement Co., now the British Columbia Cement

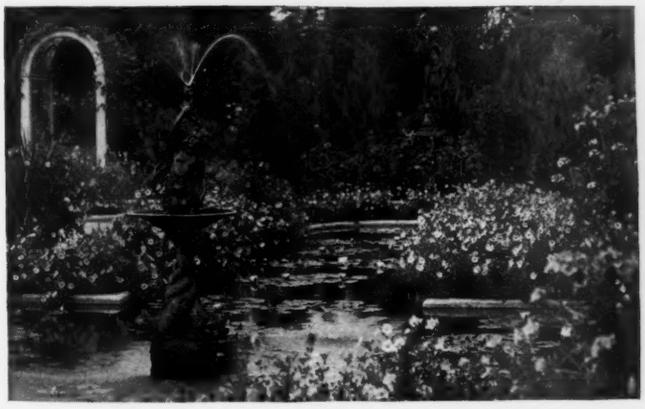
Sunken garden

Japanese garden

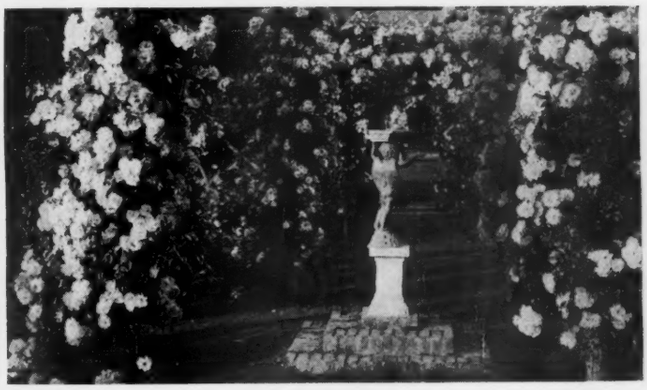
Summer house



Italian garden



Italian garden



Rose garden

The lake

The lawn

Views of the famous Benvenuto gardens of R. P. Buchart Victoria, B. C.—landscaped on the basis of an abandoned limestone quarry and cement plant

The lawn

R. P. Butchart home—Benvenuto

Co. A year or two afterwards he built the Alberta Portland Cement Co. plant at Calgary. Shortly after establishing at Calgary he acquired the lime-rock deposits on Lake Winnipeg from which the only cement plant operating between the Great Lakes and the Rockies obtains its supplies. In 1909 Mr. Butchart and his associates sold all their plants and properties to the Canada Cement Co. with the exception of the Tod Inlet plant which Mr. Butchart retained.

Successful Leader

His ability as a business executive was demonstrated in 1915 when he became interested in a small way in the Oregon Portland Cement Co. in Oregon. The company found difficulty in operation, and at the request of the shareholders Mr. Butchart was placed in control. Under his management the company met with success, and he became its president. Another plant was built at Lime, Ore., and the two were afterwards amalgamated and called the Oregon Portland Cement Co., which he now directs as its president.

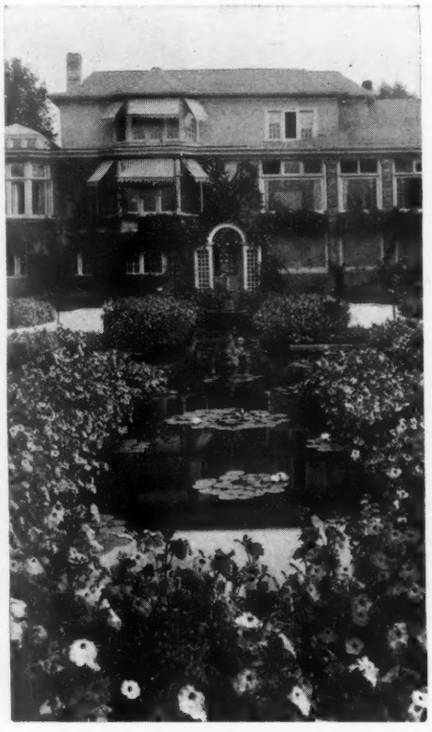
In all these ventures Mr. Butchart has been greatly helped by Mrs. Butchart, who has been his partner for 44 years. It is mainly due to Mrs. Butchart that the beautiful Benvenuto gardens were created. When Mr. Butchart established the Tod Inlet plant, although they had a home in town for three or four years, they had a cottage at the Inlet where they used to spend the summer. Mrs. Butchart, always an energetic, active woman, had to have a hobby to keep her busy in the country and turned to gardening. A modest herbaceous border was the stepping stone of the wonder garden which has since grown as the result of her ideas and energy.

Variety of Interests

Mr. Butchart's business interests embrace other than the cement industry. He is heavily interested in timber, operating through contract, one of the largest camps on the west coast at Port Renfrew. It has a standard gage railroad 16 miles long. He is president of the British Columbia Cement Co. and the Oregon Portland Cement Co., a director of the Pacific Steamship Co. of Evans Coleman and Gilley Bros., Victoria and Vancouver and New Westminster, of McLennan and McFeeley Co., Ltd., Vancouver, hardware dealers; Claybourn Co., Ltd., firebrick and fireclay manufacturers throughout British Columbia, and is a member of the advisory board for British Columbia of the Toronto General Trusts Corp.—*Victoria* (B. C.) *Times.*

Contract Let for Chicago Plant of U. S. Gypsum Co.

TEST BORINGS for foundations for the $2,500,000 plant of the United States Gypsum Co. on its 32-acre site along the Indiana Harbor ship canal, at East Chicago, Ind., were started recently. They will be completed in two weeks, when actual construction of the plant will begin. The plant is scheduled for completion next June. Contract for the general supervision of construction has been awarded to the Turner Construction Co. of Chicago. Four main factory buildings of brick and steel will be built, as well as docks and bulkheads, along the canal, and storage bins with capacity for 125,000 tons of raw gypsum. The price paid for the site is said to have been $170,000.



Italian garden

Minnesota Gravel Plant Busy

MOVING 40 cars of washed gravel and sand daily, Foley Brothers' plant at Darling, Minn., is experiencing a busy summer. A crew of 120 men is employed, with the plant in operation 20 hours a day. Two big contracts contribute greatly to the rush in business—a large ballast job on the Fargo division of the Northern Pacific and the paving job of Nolan Brothers on the state highway between Sauk Center and Osakis. The latter calls for 25,000 yd. of gravel and 15,000 yd. of sand. Delivery will continue until late in the fall.

A new pit recently opened increases the capacity of the plant. This is a two-mile haul from the plant. Increased operations are also reported at the concrete plant, where 14 men are busy night and day turning out various kinds of concrete construction. The concrete plant is operating at full capacity.—*Little Falls* (Minn.) *Transcript.*

Oklahoma County Sues to Recover Freight on Sand

A SUIT to recover about $30,000, which it is alleged has been paid out in excessive freight rates on gravel used in the county for road work, has been started before the Interstate Commerce Commission.

The case is between the county commissioners of Garfield county, Oklahoma, and the Santa Fe railroad. Suit was filed by C. L. Lockwood, commerce counsel and head of the Enid, Okla., Traffic Bureau.

The petition asks for the reparation and refund on gravel shipped into Garfield county from Kansas points and used in constructing the gravel roads on the east side of the county.—*Oklahoma City* (Okla.) *Oklahoman.*

New York Congressman Will Seek Protection for Cement Industry

A PROTECTIVE TARIFF on cement will be before Congress at its next session, supported by Representative Harcourt J. Pratt of the Catskill, N. Y., district, and approved by members of the ways and means committee of the House of Representatives with whom Mr. Pratt has discussed the subject.

Such is the information contained in a letter from Representative Pratt addressed to Harry B. Morris, former secretary of the Catskill Chamber of Commerce. "I am glad to advise you that I am in accord with your views," writes Mr. Pratt, and he adds: "I shall be glad to do anything possible in the next session of Congress to have a duty levied on cement."

Mr. Morris wrote Mr. Pratt as a citizen interested in the welfare of his home village. "Our cement companies," says Mr. Morris, "as well as other companies located in our eastern states, are hampered by the cheap cement sent to this country from Europe, which comes in free of duty. The wages paid for labor in European countries are extremely low compared with the wages paid in this country. It would be only just and fair to place a tariff on cement. Our home companies cannot pay a living wage unless they are protected against such foreign competition."—*Catskill* (N. Y.) *Examiner.*

Philadelphia's Mayor Reverses Action of City Council on Use of Foreign Cement

THE CITY COUNCIL'S attempt to ban use of all foreign-made materials in Philadelphia city contracts was blocked July 9 by Mayor Mackey in one of the most surprising upsets of the present administration.

Immediate result of the mayor's refusal to prohibit the foreign goods was an order issued by Director of Public Works Murdoch to Chief of Highways Corning eliminating the "made in America" provision from cement specifications.

The public works department is preparing to let contracts, in which cement is utilized, for more than $7,000,000 in highway work alone.

The mayor's action yesterday places him in direct opposition to the wishes of council expressed in a unanimous resolution, and marks a victory in the cement war raging for many weeks in city hall for the importers of that product who have been fighting for unrestricted bidding on the contracts.

In the last administration, cement specification proscribed imported cement, but Director Murdoch, at the outset of his term, threw down the barriers and redrew the specifications to permit bids on any product, foreign or American. Opposing this act, council adopted a resolution asking the mayor to prohibit all foreign materials in city work and the Highways Bureau prepared a rubber-stamp labeled "domestic cement only" for its bids.

In retaliation, a group of importers represented by former City Solicitor David G. Smythe, threatened a court suit to prevent the ban being imposed and Mayor Mackey's office was flooded with protests from port interests.

The "war" took on an international scope when the Belgian and British consuls called on the mayor to register their disapproval of the contemplated prohibition.

"If congress would pass a resolution like that adopted by council, it would start an industrial war," declared the mayor. "To ban all foreign materials in city contracts would work great injury to the port of Philadelphia.

"The Belgian consul came to me and said that if we ban Belgian cement, they will go to Canada and the Argentine for their wheat. The proscription could work both ways and hurt this country as much as others.

"The city solicitor submitted an opinion ruling that the city cannot bar the world from bidding. If the matter would go before the court the city would be embarrassed in attempting to fight that opinion. I believe any judge would decide the department must act on the city solicitor's decision.

"Not only the consuls and all the port interests, but longshoremen and other similar workers have appealed to me against this proposed ban. I believe the proscription would put as many such men out of work here as are in the whole cement industry in the state.

"There is another angle to this. The cement people export their goods through New York, not the port of Philadelphia, although the rates are the same and the distance is shorter from Lehigh and Northampton counties. They discriminate against the port of their state and then expect us to discriminate in their favor.

"I suppose the council passed its resolution on a patriotic impulse, but the tariff laws of this country were never based on absolute prohibition of all foreign materials. I believe in the tariff to protect American industry and labor so as not to give foreign goods any undue advantage."

It is said the foreign-made cement can underbid the domestic product by 9 to 25 cents a barrel and that much of it is imported on ships, where it is used as ballast.—*Philadelphia* (Penn.) *Enquirer.*

Belgian Cement

WHILE one can understand the emotions of the importers of Belgian cement, now that the city has decided that American cement must be used on public works, one feels more like congratulating them on being able to sell their wares so long than joining in their lamentations.

Pennsylvania is one of the greatest producers of cement in the country. It is natural and proper that Philadelphia should insist that American cement should be used by the paving contractors and let the importers sell the foreign cement to those customers who do not care where it comes from. If the importers make too much fuss about it, they are likely to stir up the domestic producers to demand that the tariff be raised to a figure equal to the difference between the cost of production at home and abroad. But even this would not prevent people so disposed to go to the relief of Belgium by buying her cement.—An editorial in the *Philadelphia* (Penn.) *Public Ledger.*

Houston, Texas, May Demand Foreign Cement Bids Separately

A SEPARATE BID will be asked of all contractors who plan on using foreign cement in the paving of city streets in Houston, Texas, it was decided recently at a conference of representatives of paving companies and city paving engineers held in City Engineer J. C. McVea's office.

The meeting was held for the purpose of revising the city's paving specifications and bringing them up to date.

It will not be mentioned in the new specifications that contractors must submit a separate bid specifying they are going to use foreign cement when such cement is to be used, it was decided.

City Paving Engineer George Byrom said the specifications go to all parts of the country and world and might "hurt the city." The city engineer will mail two bid sheets to each contractor, one specifying domestic cement and the other foreign cement.

City Engineer McVea said that the port officials were in favor of no ban on foreign cement or other foreign products and wanted no discrimination made.

When a set of paving specifications is prepared which meets with the approval of the city engineer and the paving concern it will be submitted to the city council for approval. —*Houston* (Texas) *Chronicle.*

Canada Cement Sells Glass Subsidiary

A DEAL which should considerably improve the financial position of Canada Cement Co., Ltd., is reported. It was stated that at a recent meeting of the board of directors the company's interest in its most important subsidiary, Consumers Glass Co., was sold to Frank P. Jones, formerly president of the old Canada Cement Co.

It is understood that the price involved in the purchase of the Consumers Glass Co. is $2,600,000. The receipt of this amount is expected to place Canada Cement Co. in a very comfortable financial position. It will permit the paying off of its bank loans and leave the company a substantial cash balance.--*Boston* (Mass.) *Transcript.*

Hints and Helps for Superintendents

A chain attached to the door prevents workers from heedlessly stepping onto the track

Chained Door Keeps Men from Railroad Track

AT the plant of the Louisiana Portland Cement Co. at New Orleans there is a very simply safety device for keeping a man from stepping directly out of a door and on to a railway track. It is applied to a door in the packhouse, where the loading tracks are necessarily near the building, and as the picture shows it would be very easy for a man to step out and onto the tracks without seeing a train coming, as the view of the train would be cut off by the open door.

To prevent this the door has a chain at the top which prevents it from being opened wider than is shown in the cut. When a man pushes the door open it is brought up sharply as the end of the chain is reached and this makes him think where he is going. Then the partly opened door prevents him from stepping directly onto the tracks, so that he can look around the door before proceeding.

Starting an Underground Raise or Stope

By W. L. Home
Mining Engineer, Pine Plains, N. Y.

WHEN starting a raise or a stope from an underground level of a mine it is customary in many places to simply put in the overhead holes, shoot them and let the muck fall to the floor level. This, of course, stops the passage of cars and ties up work farther ahead until the broken rock has all been cleaned out. For the first round or two this can hardly be helped. A chute should be put in as soon as possible, provided it is at all practical ever to put in a chute. The timbers of the chute can be protected from the blast by false timbers, so if a chute is to be used at all there is no need of delaying. In nonmetallic mines as compared to metal mines the blasting and breakage may be quite different. In the former the operator will probably want the rock shot up as little as possible so as not to get an excess of fines. This will result in handling larger-sized stones and a chute may not work well. In the metal mines the blasting is much heavier and consequently there are more fines and the ore will therefore run better than the larger chunks in the nonmetallic mines.

After the two rounds have been fired there will be sufficient elevation to put a platform beneath the raise and just high enough so that the cars can be pushed underneath. Have the platform as wide as the heading itself and longer than the opening of the raise. At one or two convenient places in the platform leave square holes as large as the largest sized stone you want to send to the crusher or have loaded into the cars. Cars will then be spotted below these holes and all the mucker or shoveler will have to do will be to push the broken stone down into the cars. Working this way one man will do as much as two when shoveling off of the floor and the track ahead is not blocked.

The platform is easily and cheaply constructed by cutting hitches in the opposite sides of the heading and driving fast good, sound stulls or timbers. The planking will then be laid across these timbers. Be sure that the stulls are all lined up properly and to finish the job there will be but little work. After shooting, when the platform is covered with rock, do not ever remove it all but leave a generous portion to cushion and protect the platform from the force of future blasts.

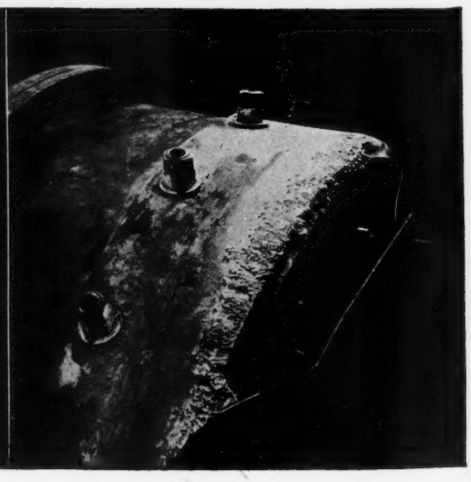
Repairing a Crack in a Large Ball Mill by Welding

A LARGE ball mill developed a crack around the end of the outside shell due to internal defects and gas pockets in the casting. Although the superintendent felt that the break could hardly be welded, he did not wish to overlook any possibility of its reclamation, and accordingly got in touch with his oxygen manufacturer for the assistance of a service man. When the oxy-acetylene service operator arrived in the plant, a crew of eight men was already at work making preparations to dismantle the ball mill.

After a careful examination the service operator advised the superintendent that he thought it would not be necessary to remove any part of the mill, as the fracture could be successfully repaired by bronze-welding the casting right in place.

The break extended for 48 in. along the

Repairing a crack 4 ft. long and 2 in. deep in a ball mill by welding



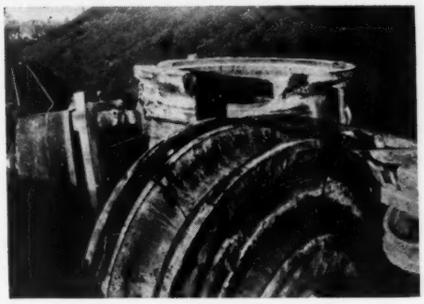
Finished job after the mill had been successfully repaired

end of the casting where the metal was 2 in. thick. It was carefully chipped out, forming a vee 2 in. deep and 48 in. long. It required only about six hours welding time to add the 40 lb. of bronze necessary to fill up this vee and also to build up a section of the casting that had broken out entirely. No preheating was necessary. As a new casting would have cost $875, plus about $300 for labor in installing it, there was a saving of over $1100 on this one job.—*Oxy-Acetylene Tips.*

Tramp Iron

By F. J. McDonald
Cobleskill, N. Y.

MOST all quarrymen or stone companies have had some experience with pieces of iron in their crushers, pulverizers, etc. Before the magnetic pulley was designed all crushers were fitted with safety pins that were supposed to break when iron or other unusual substance got in the crusher. The safety pin system worked admirably well and many times saved a very serious breakdown,



Gyratory crusher broken by tramp iron, with the broken base in back and the cracked concave case in front

although sometimes considerable difficulty was experienced in extricating the foreign substance.

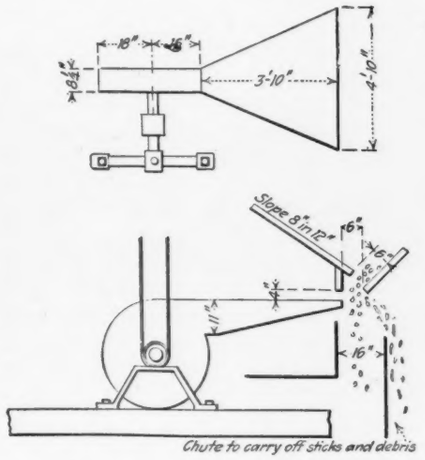
I have in mind a large crushing plant that has had a sad and costly experience with tramp iron. The damage done would run to several thousand dollars. When the plant was erected steam power was the prime mover and when the tramp iron broke the safety pin it was a strenuous operation to remove the iron. At one time it badly bent a spindle or shaft on a No. 6 McCully. The large 250-hp. engine could not easily be reversed and the crusher could not be turned backward by hand power so the only remedy was to cut, pound or sledge out the obstructing iron.

Some time later a spindle shaft was cracked by a sledge getting into the crusher and the shaft broke shortly after under the head or bell. This repair job cost around $400 or more. Twice tramp sledges were burned out with cutting torches and the last time the crusher was badly broken. The old jack shaft and pulley (that held the safety pin) became so worn and wobbly that safety pins were hard to keep in place, and had been discarded for shafts with keyed-on pulleys. These old McCully crushers were exceedingly well made, the iron being nearly twice as heavy as some of the late types, but still for the want of the safety pin the crusher was badly damaged. An ugly crack opened up in the outer shell or concave case and a very similar crack in the upper end of the base adjoining it. It was hooped or tired and has done service since but is seriously damaged.

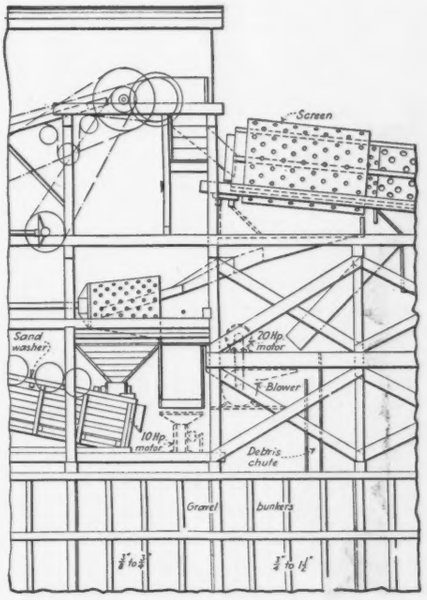
Later the power plant was changed to a 350-hp. electric motor. This was a very merciless power when anything foreign got in the crusher. It could start the plant with the large crusher loaded. About four years ago a modern new gearless crusher was installed at a reported cost of around $10,000 to $12,000, and still no provision was made to catch the tramp iron. While taking out the bed of the quarry two years ago they came a piece of an old drill bit and broke the new crusher very seriously. It was hooped or banded as best it could be with the facilities at hand and run along for a short time, but the crack allowed the concave to work loose and it dropped down and gave the crusher another rap, breaking it still worse.

If you had a very valuable watch lying on a table and a flat-iron suspended over it with a thread which would quite certainly break, you would not be liable to leave the watch there very long. To my mind it is the height of folly to operate valuable crushers (especially of the smaller gyratory types) without some provision for catching the tramp, for he is very liable to appear, and frequently with very disastrous results.

Iron large enough to damage a large crusher is liable to be discovered before it gets in, but not always. Undoubtedly the best known method yet discovered of catching tramp iron is the electric magnetized magnetic pulley. Their expense is trivial compared with the prevention of serious breaks and shut-downs. If the company I have described had installed the system years ago they would have been several thousand dollars to the good (figuring expensive breaks and shut-downs. Good standard crushers will give a remarkable long years of service if well cared for, but always remember they were made to crush stone, and not iron.



Details of air blower for removing debris from gravel



Section through gravel screening plant showing installation of blower for removing debris

Removing Debris From Aggregates With an Air Blower

ON the construction of the Bull Run dam for the water supply of Portland, Ore., the contractors encountered a difficult problem in trying to screen out the vast amount of small sticks and debris in the sand and gravel which were taken from the river gravel bars in a heavily wooded district. A large portion of the sticks had a specific gravity slightly greater than 1, and so could not be floated or screened out. Finally air blowers were suggested as a possible solution and were tried with satisfactory results.

Tests of concrete made from aggregates containing 2% sticks and debris by volume showed 15% loss in strength, very poor workability and some loss of weight. After installation of the blowers, however, the sticks and debris caused no more trouble. The specific gravity of the foreign matter being about 1 and that of the gravel about 2.7, it was a simple matter to allow the gravel to drop past in a thin sheet and regulate the blowers to remove the debris. Excess water in the gravel was also blown off; this was of some value, as after inundating the sand on this job it is necessary to draw off as much as 0.5 to 1.7 cu. ft. of water, depending upon the grading of the sand. Without the blowers it would have been impossible to use several thousand yards of local gravel.—B. E. Torper in *Engineering News-Record.*

Kentucky Towns Bid for New Cement Mill

ON JULY 16, F. B. Drew, of McAlester, Okla., and Leigh Hunt, of Kansas City, Mo., with a staff of engineers and experts, sat in solemn conclave at Frankfort, Ky., and listened to the impassioned pleas of various Kentucky local delegates for the new portland cement plant which will be built "somewhere" in Kentucky. According to the *Lexington* (Ky.) *Leader,*

"The delegations were to be limited to two men and were to be heard by Mr. Drew and the engineers in a closed executive session. Governor Sampson was to address the combined gathering before the cities presented their claims to the engineers.

"Transportation facilities, supply of limestone and other material needed for cement, labor situation, and water and power facilities are some of the things the engineers were to take into consideration before deciding which Kentucky city shall get the first plum picked from the 'Progress Tree.'

"The towns which have placed their bid for the cement plant follow:

"Ashland, Beattyville, Burnside, Burgin, Brandenburg, Bowling Green, Beaver Dam, Cresmont, Cynthiana, Cloverport, Central City, Danville, Earlington, Eddyville, Frankfort, Fredonia, Garrison, Georgetown, Hazelpatch, Hazel Green, Hopkinsville, Irvine, Irvington, Junction City, Limeville, Lawton, Lexington, Lebanon, Leitchfield, Morehead, Millers Creek, Middlesboro, Mt. Sterling, Marion, Nicholasville, Nortonville, Olive Hill, Pine Hill, Panola, Paducah, Richmond, Stanton, Somerset, Shelbyville, Shepherdsville, Versailles, Whitesburg, Winchester, Williamsburg, Wilmore and West Point."

Plan to Provide for Public Works During Lean Construction Periods

ENACTMENT at the next session of congress of legislation to create a "prosperity reserve" fund designed to stabilize industry and prevent unemployment is anticipated by Senator Jones of Washington, chairman of the senate committee on commerce.

Senator Jones is the author of a bill (S. 2475) intended to bring about the results outlined, which was reported to the senate during the closing days of the last session with the unanimous recommendation of the committee on commerce for its passage. The bill retains its place on the senate calendar and will come up for consideration when congress reconvenes in December.

In an oral statement July 16, the senator declared that he does not believe there is any serious opposition to his bill in the senate and recalled that when it came up during the closing days of the last session it was prevented from passing by the objection of only one senator. If necessary, he will endeavor to have the steering committee assign it a place on the legislative program for the coming session, but he expressed the opinion that it would be possible to pass it by unanimous consent.

The bill as reported from the committee on commerce would authorize appropriations totaling $150,400,000 to be expended on public works during periods when the volume, based upon value, of contracts awarded for construction work in the United States has fallen 10% for a three-month period below the average of the corresponding three-month periods of the preceding three years. No appropriation would be made under this authorization until the president had determined the existence of the depression specified and had communicated that fact to congress.

The bill provides that the appropriations authorized shall be apportioned as follows:

"(1) For carrying out the provisions of the act entitled 'An act to provide that the United States shall aid in the construction of rural post roads, and for other purposes,' approved July 11, 1916, and all acts amendatory thereof and supplementary thereto, $75,000,000.

"(2) For the preservation and maintenance of existing river and harbor works, and for the prosecution of such projects heretofore or hereafter authorized as may be most desirable in the interests of commerce and navigation, $50,000,000;

"(3) For prosecuting work of flood control in accordance with the provisions of the flood control acts, approved March 1, 1917, and March 4, 1923, $10,400,000;

"(4) For carrying into effect the provisions of the public buildings act, approved May 25, 1926, in respect of public buildings outside of the District of Columbia, $15,000,000."

In view of the flood control legislation enacted during the last session of congress, Senator Jones said, there has been some suggestion that the items of $50,000,000 for rivers and harbors work and $10,400,000 for flood control might be eliminated from the bill. However, he said, these authorizations do not conflict with the flood control legislation of the last session and may be retained.

Summing up the purposes of the bill, the senator referred to the report which he filed with the senate on behalf of the committee on commerce, in which he said:

"Industrial depressions seem to come and go in cycles. Why, we do not exactly know. Their prevention is most desirable and any action that will retard or prevent their recurrence will be beneficial to everybody and to every industry. One of the greatest evils from these depressions is unemployment. This affects those least able to bear it, and any measure that lessens unemployment strikes at the most vital phase of these cycles.

"There are many governmental activities that employ labor. If they can be so directed as to furnish increased employment when an industrial depression is threatened or is under way, the result must be good. This is what we seek to do by legislation.

"The principle of advance planning of public works so that expenditures may be made to influence in a good way employment conditions in the country has been accepted by all who have given it serious thought. Its application by the federal government will encourage municipal and state governments to apply it in their activities. The result locally will be good and far-reaching.

"Money spent under this bill will not be a waste. Things will be done that should be done and that will eventually be done. The money, if spent at all, will be spent for something needed and at a time when it will serve a further most useful purpose.

"The bill may not be all that it should be, but it embodies a principle fraught with great good to labor and to business. Experience will suggest changes and improvement."—*U. S. Daily* (Washington, D. C.)

The Devil Taking the Hindmost

(An Editorial in Iron Age)

DIFFERENT percentages of net profit are found among active producers in every competitive line of business. The prosperity of some is chronically "profitless," while others seem able to make money at all times. The production costs of the former are at or above the general level of net sales prices, while the latter are able to produce at costs low enough to afford them at least a reasonable margin of profit. The two groups are marked off by the zone of marginal cost. As market conditions change, a few producers in the marginal zone move in one direction or the other, passing out of it into a situation of profit or of loss.

Better location or equipment and the use of better methods characterizes the industrials which occupy the positions above the marginal cost line. As improved equipment and methods are continually developed, it follows that, by failing to acquire these, some producers must in due course find profitable competition impossible. By standing still they have gone backward. Yet, as we have heretofore pointed out, an enterprise once capitalized must generally be kept going and thus, to the hurt meanwhile of average competitors, the law of the survival of the fittest may work out but slowly.

Ageing equipment is rightly depreciated in book value; unprogressive management ought in some way to be written off also in the capital accounts. The depreciation allowance should be used to acquire better means of production just as fast as these become available.

Industries are almost always "overbuilt," if all plants possible of operation at any cost are included in the count. On the other hand, concerns which are distinguished by superior productive ability are never seriously pressed by competition.

Editorial Comment

Muscle Shoals Nitrates Bill

Among the acts of Congress which the President *did not choose to approve* was a bill providing for government operation of the Muscle Shoals nitrate plant. The bill passed both houses of Congress but was killed by the President through a "pocket veto." This was the bill referred to in ROCK PRODUCTS, April 14, 1928, as being strenuously opposed by the National Fertilizer Association, and as deserving of the opposition of all rock products producers. The Muscle Shoals nitrates plant includes the largest rotary-kiln lime plant in this country, and undoubtedly the politicians who sought to run it would soon have proposed utilizing the possible lime production to further demoralize the lime industry.

The President ought to be congratulated by every producer in the rock products industry for his courageous stand in opposing throughout his administration every move of weak-kneed politicians to put the government in businesses where it does not belong. Undoubtedly this attitude is one of the many things which has given business generally such confidence in the present administration, and is one of the keystones in the prosperity we have enjoyed during the past few years.

Portland Cement Imports

The publicity given the controversy over the use of imported portland cement for public works in the city of Philadelphia—and the fact that the city fathers have promptly reversed their previous decision not to allow its use—has given unusual prominence to the whole subject of cement imports. Public sympathy seems to be about equally divided, in spite of the fact that the newspapers, always scenting crookedness in city business, seem to lean toward the use of imported cement. We believe that is because of a lack of understanding and unjustified suspicion, in this particular case at least. For example, a man we know to be ordinarily fair-minded—an interested citizen of Pennsylvania—writes: "Our whole (United States) importations (in 1927) were slightly more than 1% of domestic production; aren't we making a tremendous fuss about an infant industry, namely, the importation of cement?"

As we have noted in these columns before, it is not the amount of imported cement that does the harm, so much as the price it is sold for. The average price, delivered at United States ports, in 1927 was about $1.44 per bbl. Only at a port where a new and thoroughly efficient portland cement mill is established could this price be met by an American manufacturer with any hope of paying his costs. The railway freight charges on a barrel of cement from the nearest American mills to consuming points generally amounts to at least half the sales price of this foreign cement.

Were the effects of imported cement limited to the port of entry, while it would mean the loss of just so much needed business to those American mills which normally serve that market, the results would not be as disastrous as they have been. The bad effects come indirectly through depressing the price of domestic cement in those markets, and with a basic commodity like portland cement, which ordinarily is sold, from necessity, at fairly uniform prices, you cannot depress the price in one market without sooner or later affecting the price in adjoining markets, and eventually, probably, the prices in all markets.

This disorganization of the price structures comes both directly from the infiltration of imported cement into nearby local markets, and (more generally) from pressure of overproduction by domestic manufacturers who are deprived by imports of normal, natural markets and to unload their surplus must break into new ones, already well served. The unfortunate part of the process is that there is no reason under the sun, if their cement is as good as they claim it is, why the European manufacturers of portland cement should not get the current American market price for it. There is no good reason why American portland cement manufacturers should cut prices to break into a new market; but there still are producers in both countries, doubtless, who think this method is the *only* way to get new business.

It is coming to be generally recognized that uniform, fair prices, which yield the producer a fair profit, are the very basis of our prosperity. It is desirable, of course, in the public interest, to have an independent check to keep prices from reaching too high a level; some time, perhaps, it will be just as clearly recognized to be in the interests of the public to have a check to keep prices from going *too low*.

An Organized Industry

There is room in every industry for local as well as national organization. Local problems should not be introduced into a national association, and national association policies need not necessarily be forced upon local groups. In Wisconsin, producers of sand, gravel and crushed stone have worked harmoniously for several years to solve the mutual problem of meeting the competition of inadequately prepared roadside gravel. In a state more plentifully supplied with *good* gravel than almost any other, we think they have at least been moderately successful.

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

Stock	Date	Bid	Asked	Dividend
Allentown P. C. com.[37]	12-30-27	3	7	
Allentown P. C. 1st 6's[37]	12- 5-27	90	92	
Alpha P. C. new com.	8- 1-28	46	47	75c qu. July 14
Alpha P. C. pfd.[2]	7-27-28	117	.....	
Amer. Aggregate 6's, bonds	7-30-28	103	103	
Am. L. & S. 1st 7's[32]	2-24-28	101¾	102½	
American Silica Corp. 6½'s	7-18-28	99½	103	
Arundel Corp. new com.	7-30-28	34½	39½	50c qu. July 2
Atlantic Gyp. Prod. (1st 6's & 10 sh. com.)[10]	7-18-28	103	109	
Atlas P. C. com.[2]	7-27-28	39	40	50c qu. June 1
Atlas P. C. pfd.	7-27-28	47	.....	66⅔c qu. July 2
Beaver P. C. 1st 7's[30]	7-27-28	97	100	
Bessemer L. & C. Class A[4]	7-28-28	35	36	75c qu. Aug. 1
Bessemer L. & C. 1st 6½'s[4]	7-28-28	100	100¾	
Boston S. & G. com.[16]	7-27-28	78	82	$1 qu. July 2
Boston S. & G. 7% pfd.[16]	7-27-28	83	85	1¾% qu. July 2
Boston S. & G. 1st pfd.[16]	7-27-28	92	95	2% qu. July 2
Canada Cem. com.[43]	7-27-28	27½	.....	
Canada Cement pfd.[43]	7-27-28	99¼	99½	1.62½c qu. June 30
Canada Cement 5½'s[43]	7-27-28	101¼	102	
Canada Cr. St. Corp. 1st 6's[48]	7-27-28	97	98	
Canada Gyp. & Alabastine	7-30-28	63	63½	
Certainteed Prod. com.	7-30-28	44⅜	44⅝	$1 qu. July 1
Certainteed Prod. pfd.	7-31-28	94½	97	
Cleveland Stone new st'k	7-31-28	65	77	50c Sept. 1
Consol. Cement 1st 6½'s, A[42]	7-19-28	94	99	
Consol. Cement 6½ notes[24]	7- 3-28	93	96	
Consol. Cement pfd.[41]	7-18-28	40	60	
Consol. S. & G. com. (Canada)	7-30-28	12	12	
Consumers Rock & Gravel 1st 7's[20*]	7-27-28	97	99½	
Coosa P. C. 1st 6's[32]	12-28-27	65	75	
Coplay Cem. Mfg. 1st 6's[40]	7-27-28	90	.....	
Coplay Cem. Mfg. com.[40]	7-27-28	12½	.....	
Coplay Cem. Mfg. pfd.[40]	7-27-28	72½	.....	
Dewey P. C. 1st 6's[30]	7-18-28	99	101	
Dolese & Shepard[7]	8- 1-28	145	150	$2 qu. July 3
Edison P. C. com.[19]	7-14-28	no market		
Edison P. C. pfd.[19]	7-14-28	no market		
Edison P. C. bonds[19]	7-14-28	80	.....	
Fredonia P. C. 1st 6½'s[32]	12-28-27	97	101	
Giant P. C. com.[25]	7-27-28	25½	30	
Giant P. C. pfd.[25]	7-27-28	34	39	3½% June 15
Ideal Cement, new com.	7-28-28	72½	74	$1 qu. July 1
Ideal Cement 5's, 1943	7-28-28	102	103	
Indiana Limestone 6's	7-30-28	94	.....	
International Cem. com.	7-30-28	64½	65½	$1 qu. June 29
International Cem. bonds 5's	7-31-28	97¼	97½	Semi-ann. int- payable June 15
Kelley Is. L. & T. new st'k	7-31-28	53	54	62½c qu. July 2
Lawrence P. C.[2]	7-27-28	106	109	2% qu.
Lehigh P. C.[2]	7-30-28	46	50	62½c Aug. 1
Lehigh P. C. pfd.[2]	7-30-28	110	110¼	1¾% qu. July 2
Lyman-Richey 1st 6's, 1932[13]	7-27-28	99	100	
Lyman-Richey 1st 6's, 1935[13]	7-27-28	98	100	
Marblehead Lime 1st 7's[14]	7-27-28	100	.....	
Marbleh'd Lime 5½'s, notes[14]	7-27-28	98	.....	
Mich. L. & C. com.[19]	7-27-28	35	.....	
Missouri P. C.	7-31-28	40½	41	50c qu. Aug. 1
Monolith P. C. com.[9]	7-26-28	15¾	16¼	8% ann. Jan. 2
Monolith P. C. pfd.[9]	7-26-28	9½	10	
Monolith P. C. units[9]	7-26-28	34¾	36¼	
National Cement 1st 7's[35]	7-13-28	99	101	
National Gypsum A com.[35]	8- 1-28	23	25	
National Gypsum pfd.[25]	8- 1-28	64	67	1¾% qu. Apr. 1
Nazareth Cem. com.[20]	7-27-28	30	32	75c qu. Apr. 1
Nazareth Cem. pfd.	7-27-28	103	107	
Newaygo P. C.[1]	12-30-27	115	.....	
Newaygo P. C. 1st 6½'s[32]	2-11-28	120	.....	
New Eng. Lime pfd., A[45]	6-14-28	95	.....	
New Eng. Lime pfd., B[22]	7-27-28	97	99	
New Eng. Lime com.[22]	7-27-28	32	35	
New Eng. Lime 1st 6's[14]	7-27-28	98	100	
N. Y. Trap Rock 1st 6's	7-27-28	102	102	
North Amer. Cem. 1st 6½'s	7-30-28	79¼	80	
North Amer. Cem. com.[19]	7-14-28	.....	10	
North Amer. Cem. 7% pfd.[19]	7-14-28	.....	38	$1.75 qu. Aug. 1
North Shore Mat. 1st 5's[15]	7-19-28	99	.....	
Northwestern States P. C.[37]	7-27-28	183	.....	
Pac. Coast Cem. 6's, A	6- 1-28	.....	98	
Pacific P. C. new com.[5]	7-28-28	18	22	
Pacific P. C. pfd.	7-28-28	77	78	1.62½ qu. Apr. 5
Pacific P. C. notes[5]	3-22-28	99	.....	3% s.-a. Oct. 15
Pacific P. C. 6's	7-28-28	98	100½	
Peerless Egyp'n P. C. com.[21]	7-27-28	1½	2½	
Peerless Egyp'n P. C. pfd.[21]	7-27-28	70	80	1¾% qu. July 1
Penn-Dixie Cem. 1st 6's[29]	7-30-28	94⅝	95	
Penn-Dixie Cem. pfd.[28]	7-30-28	78	80	1.75 qu. July 1
Penn-Dixie Cem. com.	7-30-28	14⅝	15⅛	50c qu. July 1
Petoskey P. C.	7-27-28	9	10	1½% qu.
Pittsfield L. & S. bonds[31]	10- 8-27	.....	100	
Pittsfield L. & S. com.[31]	10- 8-27	.....	25	
Riverside P. C. 1st pfd.	7-27-28	180	.....	1.50 Aug. 1
Riverside P. C., A	7-27-28	21	22½	31¼c cum. part. Aug. 1
Rockland-Rockport Lime 1st pfd.[10]	5-17-28	.....	100	3½% s.-a. Feb. 1
Rockland-Rockport Lime 2nd pfd.[10]	5-17-28	.....	60	3% s.-a. Feb. 1
Rockland-Rockport Lime com.[10]		no market		1½% qu. Nov. 2
Sandusky Cem.	7-31-28	203	210	$2 qu. July 2
Santa Cruz P. C. bonds	7-28-28	105¾	.....	6% annual
Santa Cruz P. C. com.	7-28-28	90	92½	$1 qu. Apr. 1
Schumacher Wallboard com.	7-27-28	16½	17	50c May 15
Schumacher Wallboard pfd.	7-27-28	.....	25½	
Southwestern P. C. units[44]	7-23-28	275	.....	
Superior P. C., A[20]	7-27-28	45½	47½	part 27½c, Aug. 1
Superior P. C., B[20]	7-27-28	33	34	
Trinity P. C. units[37]	7-27-28	152	157	
Trinity P. C. com.[37]	7-27-28	48	.....	
U. S. Gypsum com.†	8- 1-28	57½	58½	40c qu. June 30
U. S. Gypsum, rts.	8- 1-28	17	17¼	
U. S. Gypsum pfd.	8- 1-28	123	128	1¾% qu. June 30
Universal G. & L. com.[8]	7-18-28	1	1½	
Universal G. & L. pfd.[8]	7-18-28	10	14	1½% Feb. 15
Universal G. & L., V.T.C.		no market		
Universal G. & L. 1st 6's[8]	7-18-28	.....	60	
Upper Hudson Stone 1st 6's, 1951[32]	12-28-27	92	.....	
Vulcanite P. C. 1st 7½'s[32]	12- 5-27	105	109	
Chas. Warner com.	7-27-28	34	36	50c qu. July 10 & 25c ex.
Chas. Warner pfd.	7-27-28	109	.....	1¾% qu. July 26
Whitehall Cem. Mfg. com.[36]	7-27-28	150	.....	
Whitehall Cem. Mfg. pfd.[36]	7-27-28	98	.....	
Wisconsin L. & C. 1st 6's[15]	7-31-28	100	.....	
Wolverine P. C. com.	7-31-28	5¾	7	15c qu. Aug. 15
Yosemite P. C., A com.[20]	7-27-28	5¾	6¼	

†10% stock dividend, July 10. U. S. Gypsum common holders of record July 14 have the right to purchase new common at $20 a share to the extent of 50% of holdings. Right expires Oct. 1. Payments of 25% are due: Oct. 1, 1928; Feb. 1, June 1, and Oct. 1, 1929. *Called for redemption as of Sept. 1, 1928. [1]Quotations by Watling, Lerchen & Hayes Co., Detroit, Mich. [2]Quotations by Bristol & Willet, New York. [3]Quotations by Rogers, Tracy Co., Chicago. [4]Quotations by Butler, Beading & Co., Youngstown, Ohio. [5]Quotations by Freeman, Smith & Camp Co., San Francisco, Calif. [6]Quotations by Frederic H. Hatch & Co., New York. [7]Quotations by F. M. Zeiler & Co., Chicago, Ill. [8]Quotations by Ralph Schneeloch Co., Portland, Ore. [9]Quotations by A. E. White Co., San Francisco, Calif. [10]Quotations by Lee Higginson & Co., Boston and Chicago. [11]Nesbit, Thomson & Co., Montreal, Canada. [12]E. B. Merritt & Co., Inc., Bridgeport, Conn. [13]Peters Trust Co., Omaha, Neb. [14]Second Ward Securities Co., Milwaukee, Wis. [15]Central Trust Co. of Illinois, Chicago. [16]J. S. Wilson, Jr., Co., Baltimore, Md. [17]Chas. W. Scranton & Co., New Haven, Conn. [18]Dean, Witter & Co., Los Angeles, Calif. [19]Hoit, Rose & Troster, New York. [20]Quotations by Bond & Goodwin & Tucker, Inc., San Francisco. [21]Baker, Simonds & Co., Inc., New York. [22]Pirnie, Simons and Co., Springfield, Mass. [23]Blair & Co., New York and Chicago. [24]A. B. Leach and Co., Inc., Chicago. [25]Richards & Co., Philadelphia, Penn. [26]Hincks Bros. & Co., Bridgeport, Conn. [27]J. G. White and Co., New York. [28]Mitchell-Hutchins Co., Chicago, Ill. [29]National City Co., Chicago, Ill. [30]Chicago Trust Co., Chicago. [31]McIntyre & Co., New York, N. Y. [32]Hepburn & Co., New York. [33]Boettcher & Co., Denver, Colo. [34]Kidder, Peabody & Co., Boston, Mass. [35]Farnum, Winter and Co., Chicago. [36]Hanson and Hanson, New York. [37]S. F. Holzinger & Co., Milwaukee, Wis. [38]McFetrick and Co., Montreal, Que. [39]Tobey and Kirk, New York. [40]Steiner, Rouse and Stroock, New York. [41]Hornblower & Weeks, Chicago, Ill. [42]E. H. Rollins, Chicago, Ill. [43]Jones, Heward & Co., Montreal, Que. [44]Tenney Williams & Co., Inc., Los Angeles, Calif. [45]Tifft Bros., Pittsfield, Mass.

INACTIVE ROCK PRODUCTS SECURITIES (Latest Available Quotations)

Stock	Price bid	Price asked
Asbestos Corp. of Amer., 5 sh. pfd., 5 sh. com.[1]	$1 for the lot	.....
Atlanta Shope Brick and Tile Co[1]	25c	.....
Benedict Stone Corp. (cast-stone), 50 pfd., 390 com.[1]	$400 for the lot	.....
Benedict Stone Corp. 1st 7's 1934[6]	.....	86
Blue Stone Quarry, 60 sh.[2]	$10¼ for the lot	.....
Eastern Brick Corp., 7% cum. pfd.[1]	40c	.....
Eastern Brick Corp. (sand lime brick) com.[1]	40c	.....
International Portland Cement Co., Ltd., pfd.	30	45
Globe Phosphate Co., $10,000 1st. mtg. bonds, $169.80 per $1000 paid on prin.	$50 for the lot	.....
Iroquois S. & G. Co., Ltd., 2 sh. com., 3 sh. pfd.[1]	$12 for the lot	.....
Knickerbocker Lime Co.[4]	105	.....
Missouri Portland Cement Co., 7% serial bonds	104¾	104¾
Olympic Portland Cement Co.[7]	.....	£1⅝
Phosphate Mining Co.[1]	1	.....
River Feldspar & Mill'g Co., 50 com., 50 pfd.[1]	$200 for the lot	.....
Rockport Granite Co., 1st 6's, 1934	90	.....
Simbroco Stone Co.[2]	12	12
Simbroco Stone Co.,[9] 40 sh. pfd., par $50; 40 sh. com., par $10 (40 units)	$2 per unit	.....
Simbroco Stone Co.,[10] 10 sh. pfd., par $50	$10.25 per sh.	.....
Southern Phosphate Co.[6]	1¼	.....
Standard Gypsum Co., 10 sh. pfd., 5 sh. com.[1]	$35 for the lot	.....
Tensas Gravel Co., 180 sh. com.[1]	$1 for the lot	.....
Tidewater Portland Cement Co., 3000 sh. com.	$6525 for the lot	.....
Vermont Milling Products Co. (slate granules), 22 sh. com. and 12 sh. pfd.[6]	$1 for the lot	.....
Wabash Portland Cement Co.[1]	60	100
Winchester Brick Co., pfd., sand lime brick[5]	10c	.....

[1]Price obtained at auction by Adrian H. Muller & Sons, New York. [2]Price obtained at auction by R. L. Day and Co., Boston. [3]Price obtained at auction by Weilupp-Bruton and Co., Baltimore, Md. [4]Price obtained at auction by Barnes and Lofland, Philadelphia, on April 4, 1928. [5]Price obtained at auction for lot of 50 shares by R. L. Day and Co., Boston, Mass. [6]Price obtained at auction by Wise, Hobbs and Arnold, Boston, Mass. [7]Neidecker and Co., London, England. [8]Auction sale of $1000, Barnes & Lofland, Philadelphia, March 31, 1928. [9]Price at auction May 2, 1928, by Wise, Hobbs & Arnold, Boston. [10]Price at auction, June 6, 1928, R. L. Day & Co., Boston, Mass.

Consumers Rock and Gravel Company, Los Angeles, Bond Offering

ANNOUNCEMENT of the merger of the Consumers Rock and Gravel Co. and the California Materials Co., both of Los Angeles, Calif., appeared on p. 87 of ROCK PRODUCTS, July 7. Financing of the new consolidation is through a $1,500,000, first mortgage, 20-year, sinking fund, 6% gold bonds, offered the public by Tenney Williams and Co., Los Angeles.

The following information is furnished by Frank Gautier, president of the consolidation, which is known as the Consumers Rock and Gravel Co., Inc.:

Business and Territory—Consumers Rock and Gravel Co., Inc., was recently incorporated in Delaware for the purpose of consolidating the Consumers Rock and Gravel Co., incorporated in 1912, and the California Materials, Inc., the predecessor of which company was organized also in 1912.

The company is one of the leading corporations in southern California in the production and marketing of crushed rock, screened gravel and sand for use in the construction and maintenance of railroads, highways, streets, buildings, harbor improvements, etc., and of irrigation, flood control and reclamation projects. Its products are used in large quantities in all construction involving the use of macadam, asphalt and concrete.

The territory served by the company includes Santa Barbara, Ventura, Los Angeles, Riverside, San Bernardino, Orange and Imperial counties. It is estimated that in this district, with a population of approximately 2,000,000, the company supplies over 30% of the rock, gravel and sand requirements.

Property and Equipment—The company owns or controls and operates nine rock crushing plants. Five of these plants are located on the rich deposits of the Tujunga Wash in the San Fernando Valley, one in Vernon at 26th and Alameda streets, one on the San Gabriel Cone near Baldwin Park and two in Ventura county. In addition, the company owns a decomposed granite quarry furnishing a high grade quality of road material for which the company has an active market. The combined capacity of these plants is in excess of 21,000 tons of material per 10-hour day.

All of the producing plants except two are located on either the Pacific Electric or Southern Pacific railroads. In addition, the company owns and operates a fleet of 150 heavy duty trucks. The company's products are distributed from four bunkers which are strategically located in Hollywood, Vernon, Whittier and Santa Barbara, as well as from its plants. Storage capacity is in excess of 23,000 tons. The company's excellent transportation facilities plus the location of its plants and bunkers insure the shipment of its products at the lowest possible cost and enable it economically to serve its territory.

The company holds as a reserve 1478 acres of producing lands, of which 313 acres are owned in fee and 1165 acres held under favorable leases. It is conservatively estimated by Sanderson and Porter, engineers, that these lands contain a minimum of 242,000,000 tons of raw material. Upon the basis of sales in 1927, the largest year in the company's history, these reserves are sufficient to last at least 50 years, which is 30 years beyond the maturity date of this issue of bonds. The proportion of sand to rock in the raw materials approximates the market requirements and thus reduces to a minimum the amount of waste material. Ample water supply for production is available from the company's own wells.

In addition to their value as sources of supply, some of these properties are valuable as industrial real estate. The property in Vernon, for example, consisting of 14.14 acres on Alameda near 26th street in the heart of the Los Angeles industrial district, is valued at $590,000, solely from the standpoint of its worth as an industrial site. All of the company's plants and equipment are maintained in good operating condition and its plant near Baldwin Park, with 4000 tons per 10-hour day capacity, is perhaps not to be equaled in the industry. The capacity of this plant can be increased at a nominal expense to 6000 tons per 10-hour day.

CAPITALIZATION

(After giving effect to present financing)

	Authorized	Outstanding
First mortgage 6% sinking fund gold bonds (this issue)	$2,500,000	$1,500,000
Preferred stock, 7% cumulative (par value $25)	1,000,000	None
Common stock (no par value), shares	150,000	120,000

Security—These bonds will be secured by a first mortgage on all land, plant and equipment recently appraised by Sanderson and Porter, engineers, as having a sound value of $3,670,269, including land values of property owned in fee of $1,542,400. In addition Sanderson and Porter estimate the present value of the leaseholds to be $600,000. The balance sheet of the company, as of December 31, 1927, after giving effect to this financing, shows net current assets of $510,197.18, or a ratio of current assets to current liabilities of 3¼ to 1.

The trust indenture will provide that the company shall assign to and deposit with the trustee for the further protection of the bondholders (*a*) all leases of real property it now owns or may hereafter acquire and (*b*) approximately 51% of the capital stock of the Saticoy Rock Co.

Earnings—The earnings of the predecessor companies, as certified by Haskins and Sells, certified public accountants, are as shown in the accompanying table.

For the three-year period ended December 31, 1927, the company's net earnings, after depletion and depreciation available for bond interest, have averaged $295,013.79 per annum, which is 3.28 times the maximum annual interest requirements on first mortgage bonds to be presently outstanding. Net earnings for the year ended December 31, 1927, of $356,449.78 were practically four times the maximum annual interest charge on these bonds and 2.69 times the estimated average annual requirements for interest and sinking fund combined.

Sinking Fund—The trust indenture will provide for payment to the trustee on or before July 25 of each and every year the sum of $45,000, and on or before December 26 of each and every year commencing December 26, 1929, the sum of $87,500, these sums to be applicable first to the payment of bond interest and next to the retirement of principal. These semi-annual payments are estimated to be sufficient to retire all bonds of the present offering by maturity.

In addition, the indenture will provide that the company shall expend each year during the life of this bond issue an amount equal to not less than 5% of its net earnings after depreciation, depletion, amortization, obsolescence, bond interest and sinking fund payments and federal income taxes for the preceding calendar year either (*a*) for the acquisition of construction of additional properties against which no bonds are to be issued, or (*b*) for the purchase or redemption of bonds of this issue at not more than the call price.

Mortgage Provisions—The trust indenture under which these bonds are to be issued will authorize a total of $2,500,000 of bonds, including this issue. Additional bonds may be issued (*a*) up to but not in excess of 50% of the fair value of additional plants, equipment or lands constructed or hereafter acquired by the company, such value to be determined by engineers acceptable to the trustee and to the underwriters. (*b*) Only when the net earnings of the company or its predecessors (after fair and reasonable deductions for depreciation, depletion, amortization and obsolescence), together with similar net earnings from properties being acquired for 12 months out of the 14 months next preceding the issuance of additional bonds, and also for an average of the preceding three fiscal years, shall have been not less than three times the interest requirements on bonds at the time outstanding, together with those proposed to be issued.

EARNINGS OF CONSUMERS ROCK AND GRAVEL CO.'S PREDECESSOR COMPANIES

	Year ended December 31— 1927	1926	1925
Net sales	$2,457,423.25	$1,753,180.27	$1,024,469.44
Less cost of sales, general expenses, and miscellaneous charges (exclusive of depletion and depreciation)	1,982,970.10	1,373,904.82	785,919.59
Profit from operations	$ 474,453.15	$ 379,275.45	$ 238,549.85
Other income, including proportion of net income of subsidiaries	104,397.92	98,844.13	56,330.96
Gross income	$ 578,851.07	$ 478,119.58	$ 294,880.81
Depletion and depreciation	222,401.29	141,493.81	102,914.99
Net income applicable to bond interest and federal income taxes	356,449.78	336,625.77	191,965.82
Number of times maximum annual interest of $90,000 on this issue earned	3.96	3.74	2.13

BALANCE SHEET

The following is a pro forma balance sheet of Consumers Rock and Gravel Co., Inc., as of December 31, 1927, as prepared by Haskins and Sells, after giving effect to the present financing:

ASSETS

Property (sound value as reported by Sanderson and Porter)		
Land:		
Owned in fee		$1,542,400.00
Held under lease		600,000.00
Buildings, machinery and equipment (depreciated values)		2,127,869.00
Total property		$4,270,269.00
Funds on deposit with trustees, etc.		83,736.31
Investments in affiliated companies		116,054.18
Securities owned		1,800.00
Due from officers and employes		12,465.27
Current assets:		
Cash	$	397,602.14
Notes and acceptances receivable		25,430.94
Accounts receivable:		
Customers' (less reserve for doubtful accounts)		268,603.42
Affiliated companies		14,120.48
Inventories (not verified under audit as to quantities)		31,279.50
Total current assets	$	737,036.48
Deferred charges and prepaid expenses	$	120,621.12
Total		$5,341,982.36

LIABILITIES	
First mortgage 6% sinking fund gold bonds, due 1948	$1,500,000.00
Purchase money obligations	340,000.00
Current liabilities:	
Notes and acceptances payable	13,713.61
Accounts payable	213,125.69
Total current liabilities	$ 226,839.30
Due to stockholders	$ 35,982.51
Reserve for collisions	3,982.09
Capital stock and surplus:	
Capital stock — authorized, 150,000 shares without par value; outstanding, 120,000 shares	$1,200,000.00
Paid-in surplus	412,149.94
Capital surplus (arising from revaluation of property assets)	1,623,028.52
Total capital stock and surplus	$3,235,178.46
Total	$5,341,982.36

Purpose of Issue—The proceeds of the sale of these bonds will be used to retire the funded debt of the Consumers Rock and Gravel Co. and that of the California Materials, Inc., to liquidate certain purchase money contracts and for other corporate purposes.

Insurance—A bondholders' policy of title insurance will be issued by the Title Insurance and Trust Co. of Los Angeles in an amount equal to the face value of this bond issue insuring that the deed of trust or mortgage securing said bonds is a first lien on all lands and leasehold interest described therein. Fire and other necessary insurance satisfactory to the underwriters will also be carried by the company. These various policies will be deposited with the trustee.

Management—The present stockholders and management of the Consumers Rock and Gravel Co., Inc., have been in control of the business since the latter part of 1913. Throughout this 15-year period the predecessor companies have shown large earning power on invested capital and through a conservative dividend policy and reinvestment of earnings these properties have been developed to their present state of efficiency and earning capacity. The company is in the hands of men who have built up a splendid reputation in the trade.

Pennsylvania-Dixie Earnings

WHEN directors of Pennsylvania-Dixie Cement Corp. meet for dividend action on the common stock, probably in September, it is expected in well informed circles, the quarterly dividend of 50 cents a share will be omitted. A severe decline in earnings in the past year will necessitate this action, it is felt, unless a most substantial increase in net is registered in the first two months of the third quarter. In September of last year the common dividend was reduced from $3.20 annually to the present rate of $2 a share.

Earnings for the six months ended June 30, 1928, showed net profits of $318,000, equal to $2.34 a share on the 135,888 shares of preferred stock. This compares with net of $924,800 or $1.17 a share on the 400,000 shares of common stock outstanding in the corresponding months of 1927. These figures show that profits in the first half of 1928 were nearly one-third less than for the corresponding period a year ago and that preferred dividend requirements of $3.50 a share for the first two quarters this year were not met, net earnings being short of this figure in the amount of $1.16 a share.

In April, the Pyramid Portland Cement Co., of Iowa, was purchased for $1,074,000 in cash. This transaction reduced the cash account from $2,077,000 in 1927 to $965,000 at the close of June. Accounts and notes payable rose from $227,000 in June, 1927, to $676,000 for the period just closed. While the company remains in good financial condition with the ratio of current assets to current liabilities over 4 to 1, it is doubtful whether directors would deem it best to continue common dividends unless these are earned in view of the impairment of working capital that would be entailed.

Earlier this year it was expected this company would join with the North American Cement Corp. to form the General Cement Corp. The proposed merger was later abandoned. The acquisition of the Pyramid company gave Penn.-Dixie additional capacity of 1,250,000 bbl., bringing the total up to around 12,500,000 bbl. Improvements and enlargements are being made to the new company to increase its capacity and reduce the costs. When these are completed this acquisition will undoubtedly contribute more largely to earnings of the parent company.—*Wall Street News*, New York City.

International Cement Shows Slight Gain

THE International Cement Corp. for the quarter ended June 30, 1928, reports a net income of $1,128,529 after depreciation, federal taxes, etc., equivalent after 7% preferred dividend requirements to $1.68 a share earned on 618,826 shares of no-par common stock. This compares with $1,067,928 or $1.60 a share on 562,500 common shares in the preceding quarter and $1,142,253 or $1.74 a share on 562,500 common shares in the second quarter of 1927.

Net income for the first six months of 1928 totaled $2,196,458 after above charges, equal to $3.14 a share on 618,826 common shares, against $2,048,546 or $3.04 a share on 562,500 common shares in the first six months of the previous year. Preferred stock was called for redemption on May 20, 1928.

Shipping, selling and administrative expenses for the first six months of 1928 were $2,291,378 compared with $1,945,023 for the first six months of 1927. For the second quarters of the two years the figures are $1,277,619 and $1,040,756, respectively.

Income account for quarter ended June 30, 1928, compares as shown in the table at the foot of this page.

EARNINGS STATEMENT OF PENNSYLVANIA-DIXIE CEMENT CORP., JANUARY-JUNE, 1928

Period ending June 30.	1928—6 Mos.	—1927	1928—12 Mos.	—1927
Profit after depreciation and depletion	$737,800	$1,443,583	$2,316,326	$4,343,914
Interest	373,879	374,382 }	955,393	1,249,032
Federal taxes	45,490	144,342 }		
Net profit	$318,431	$ 924,859	$1,360,933	$3,094,882
Shares of common stock (no par) outstanding	400,000	400,000	400,000	400,000
Earned per share	Nil	$1.17	$1.02	$5.46

North American Cement Earnings

THE North American Cement Corp. for the first half of 1928 reports a net loss of $85,388 after interest, depreciation, depletion, etc., against net profit of $242,311 after depreciation and depletion, but before interest, federal taxes, etc., in the same 1927 period.

British Cement Concern Increases Capital

THE Associated Portland Cement Co. of London, England, has announced that its capital will be increased from £5,000,000 to £6,000,000.

Block of U. S. Gypsum Co. Stock Sold

LEE, HIGGINSON AND CO. have disposed at private sale of the common stock of the United States Gypsum Co. which they recently acquired from the estate of Ralph Van Vechten. About 15,000 shares were involved in the transaction.—*Wall Street Journal* (New York City).

EARNINGS OF THE INTERNATIONAL CEMENT CORP., SECOND QUARTER OF 1928

	1928	1927	1926	1925
Gross sales	$ 8,743,632	$ 7,868,402	$ 6,856,967	$ 5,452,301
Expenses, etc.	6,620,226	5,951,419	5,038,723	3,855,413
Depreciation	592,050	470,943	465,286	270,406
Net	$ 1,531,356	$ 1,446,040	$ 1,352,958	$ 1,326,482
Other income				5,149
Total income	$ 1,531,356	$ 1,446,040	$ 1,352,958	$ 1,331,631
Interest, taxes, etc.	402,827	303,787	294,172	221,028
Net income	$ 1,128,529	$ 1,142,253	$ 1,058,786	$ 1,110,603
Six months ended June 30:	1928	1927	1926	1925
Gross sales	$15,463,571	$13,842,127	$11,705,169	$ 9,234,502
Expenses, etc.	11,641,034	10,500,361	8,707,016	6,588,776
Depreciation	992,099	794,404	717,701	441,761
Net	$ 2,830,438	$ 2,547,362	$ 2,280,452	$ 2,203,965
Other income				13,163
Total income	$ 2,830,438	$ 2,547,362	$ 2,280,452	$ 2,217,128
Interest, taxes, etc.	633,980	498,816	475,495	392,587
Net income	$ 2,196,458	$ 2,048,546	$ 1,804,957	$ 1,824,541

Rockland and Rockport Lime Company Passes First Preferred Dividend

DIRECTORS of the Rockland and Rockport Lime Co. have voted to pass the semi-annual dividend of $3.50 a share on the first preferred stock, due at this time. President George B. Wood, in a letter to stockholders, says that such action was deemed necessary in order to conserve the cash resources of the company.

In a letter to stockholders in connection with passing first preferred dividend, Kidder Peabody and Co. say in part: "This action is due to present competitive conditions in the lime industry which has been reflected in net earnings of the company. The financial condition of the company is strong. Quick assets as compared with quick liabilities being at the ratio of three to one. If we sold to you directly or through our correspondents, some of this stock, and if you wish to receive the amount of the dividend payable August 1, without waiting until it is paid by the company itself, we are prepared to advance you the amount upon your agreement to repay it to us when the dividend is paid by the company."—*Wall Street News* (New York City).

Canada Cement Company Earnings

SATISFACTORY RESULTS are being secured by the Canada Cement Co. in the first year of operations under new control.

At present the company is very busy, this being the peak of the shipping period, which extends from about the middle of March to the first of November.

So far sales have been about 10% in excess of those for last year, which aggregated approximately 7,500,000 bbl. While the percentage increase does not indicate any unusual improvement in the company's position, the comparison is more significant when it is realized that at the present rate sales are likely to be 750,000 bbl. over last year.

As for earnings, there is likely to be more than a proportionate increase. While a decrease of 25c. a barrel has been made in the price of cement in western Canada, eastern prices have been increased from 8 to 22c. a barrel. Thus the lower net profit per barrel in the west is offset by the larger volume of sales and higher prices in the eastern area.

The financial statement for last year has not been issued as yet, in view of the sale of the old company and the attendant reorganization work. However, the bankers estimated, on the basis of nine months' results, that earnings for the 12 months, available for bond interest, depreciation, income taxes, etc., would amount to $4,583,649. Such being the case, it is reasonable to assume that earnings for the current year will aggregate approximately $5,000,000, provided there is no setback.

At the present time seven of the company's plants are in operation. If pressed for additional output, the company could put into service nine plants. These plants, of course, are not working to capacity; their rated capacity being far in excess of requirements for some time to come. Operations, however, are very satisfactory and except for one or two plants are greater than for last year.

Considerable work has been done this year in improving the plants, with a view to greater production and lower manufacturing costs. To this end expenditures have been made on alterations to the Belleville plant and the complete renovation of the Winnipeg unit.

The latter has been converted to the wet process of manufacturing and at present is being tuned to maximum production. A run of as high as 3400 bbl. a day has already been recorded by the Winnipeg plant and it is believed that this can be increased to 4000 bbl. a day.

Minor, but nevertheless important, improvements have been made at the other plants without the expenditure of any large sums of money, with the result that the efficiency of all plants has been greatly increased.

The plants of the Canada Cement Co. have long been noted for their efficiency and low cost operations. Some of the results obtained are truly outstanding. At present, for example, the per man production is twice as much as it was in pre-war days. While improvements have been made in the type of machinery used, a great deal of the credit for this better showing is given to the increased efficiency of the individual workman.

One of the causes contributing to the excellent teamwork among the different departments of the company, lower operating costs, increased output, etc., has been the introduction of a safety campaign. This campaign has been carried on enthusiastically since 1920 by all the employes and some remarkable results have been achieved.

Between the years 1920 and 1927, for instance, reports from the five main plants of the Canada Cement Co. show a reduction of 75% in the number of accidents; 87% in the amount of money paid for doctors' and nurses' services, hospital fees, compensation, etc., has been lowered by 87%; while efficiency, on the basis of production per hour of labor, has been increased 86%. This is probably the finest showing made by any cement company on the continent. Consequently the morale and teamwork of the employes today are at a very high pitch. The value of this to the company cannot be judged in dollars and cents, but that it has a tangible worth is evident from the splendid record of the company over the past 10 years.

The immediate outlook for the company is promising. Export sales to date have been satisfactory and no sharp falling off in demand is expected. This is only a small end of the company's business, however, but a survey of the domestic market is even more encouraging, in spite of the fact that the Welland canal work, which has used as high as 300,000 bbl. a year, will soon be completed.

Since the beginning of the year approximately $300,000,000 worth of new building has been undertaken in Canada. While the precentage of this work that goes to the cement industry is relatively small from the point of view of monetary value, the quantity of cement needed is well above the normal demand. The Canada Cement Co., of course, is getting its share of this business.

Aside from this undertaking, which is still in a nebulous state, the fact remains that the company is experiencing an excellent volume of business with a proportionate increase in earnings. The company should continue to record a steady expansion, both in production and profits.

Recent Dividends Announced

Asbestos Corp. pfd. (quar.)	1¾%, July 16
Bessemer Limestone and Cement, A (quar.)	75c, Aug. 1
International Agricultural Corp. pfd.	1¾%, Sept. 1
Kentucky Consol. Stone Co. pfd. (quar.)	1¾%, July 14
Missouri Portland Cement Co. (quar.)	50c, Aug. 1
North American Cement Corp. pfd. (quar.)	$1.75, Aug. 1
Riverside Portland Cement Co. 1st pfd.	$1.50, Aug. 1
Riverside Portland Cement Co. com.	31¼c, Aug. 1
Superior Portland Cement, A (part)	27½%, Aug. 1
Wolverine Portland Cement (quar.)	15c, Aug. 15

National Cement Company of Canada to Dissolve

NECESSARY ARRANGEMENTS are being made to dissolve the National Cement Co., Montreal, Que., some time in November. At that time the shareholders will receive their equity.

This company was incorporated in 1923 for the purpose of manufacturing and distributing portland cement. A plant was established in Montreal East with a capacity of 3600 bbl. a day, and production commenced in November, 1925.

The National Cement Co. shortly thereafter became involved in a price war with the Canada Cement Co. The result of this fight never became known, as the National Cement Co. has not published an annual statement, nor did the report of the Canada Cement Co. reflect any pronounced change.

In February this year, however, the National company was acquired by Alfred Rogers and associates of Toronto.

The company's capital includes $1,450,000 of 7% first mortgage bonds, $1,979,300 7% cumulative preferred and 60,000 shares of no par value common stock. The latter is all privately held.

How the Ironton Cement Plant Won Its 1927 Trophy*

Keeping the Safety Interest Alive Among the Mill Workers

By W. W. Hamilton
Plant Engineer, Alpha Portland Cement Co., Ironton, Ohio

IN THE YEAR 1920 the Ironton plant was owned by the Ironton Portland Cement Co., and at this time the word "safety" as we know it now was practically unknown. It was taken for granted that it required so many accidents to make 1,000 bbl. of cement just as it required so many tons of coal, in fact, an increase in coal consumption always created more excitement and caused more worry than an increase in accidents.

In 1921 our plant was absorbed by the Alpha Portland Cement Co. and shortly afterwards we found that there was a fellow by the name of Frame in the Alpha organization who seemed to worry himself and us too, over the number of accidents we were having. He even went so far as to ask us to send him a monthly report giving him a description of each accident which occurred during the preceding month.

These reports were sent in regularly but several months later we received another letter from Mr. Frame asking us to organize a plant safety committee and he inclosed in his letter a supply of blank forms on which we were to report the activities of our committee each month. Something else to worry about we thought. But in order not to be guilty of insubordination we organized a committee composed of our superintendent, mine superintendent, chemist, mill foreman, millwright and myself. As I look back and compare this, our first committee, with our present live-wire organization, which is right up on its toes all of the time, I can see what a poor excuse it was. Towards the close of a month someone would suggest that we had better make an inspection trip so we could send in a report. So we would start out like a flock of lost sheep and wander through the mill. On every side of us were death traps and unguarded machinery which fairly shrieked their dangerousness at us, but we had eyes but saw not. These inspections, mind you, were made in a plant that since has been rebuilt from top to bottom.

To make a long story short, this committee would return with two or three recommendations (I might say that if our present inspection committee was turned loose in a similar place its number of recommendations would not be less than two or three hundred). The report would be made out and our conscience was clear for another month.

In the meantime we were receiving reports of the accident records of other Alpha plants from Mr. Frame and of other companies from the Portland Cement Association and we realized that we were not getting anywhere. By this time there were several men in the plant that were beginning to show a little interest so we decided that it might help to enlarge our committee by the addition of these men. This was done and our committee was the better for it. The men we added were not foremen but were conscientious fellows and took their positions as a member of the committee seriously. If they saw a dangerous condition they called it to our attention and if they saw a fellow workman doing any unsafe practice they called his attention to it. It was, however, the latter which caused us to realize that these men did not belong on the committee. The man whose attention was called would usually ask the committeeman when he got to be a foreman and other similar sarcastic questions. So these committeemen asked to be removed saying that while they were on the committee they intended doing their duty but they did not like to incur the ill will of their fellow workmen.

W. W. Hamilton

Safety Committee Includes Only Foremen and Heads of Departments

The interest in safety was gradually growing due to "No Accident Month Campaigns," letters of encouragement from our management and because of the fact that several departments of the mill had been rebuilt and all machines properly safeguarded by the construction gang before being turned over to the operating crew.

So it was decided to again enlarge our committee but to have it so that it would include only foremen or heads of departments. This we believe is the best committee that can be had and from what we can learn most other plants have come to the same conclusion. Our superintendent at this time had become very much interested in our safety work and made it a point to attend all our meetings but we found that his presence had an adverse effect in that it kept the men from freely expressing their opinions for fear that they might conflict with his. Our superintendent was quick to notice this attitude and at his suggestion he remained away from the majority of the meetings. The change in our foremen was almost instantaneous, new ideas were brought out and unsafe conditions called to our attention that were unfamiliar to practically all with the exception of those men in the department in which these conditions existed. Our committeemen have now gotten over their backwardness and feel as free to express their opinions before the superintendent as they do before a committeeman.

If there is any difference of opinion between the superintendent and safety committee, as for example in the necessity of a safeguard at a certain point which was recommended by the safety committee the superintendent is called in to the meeting and asked to give his reasons why this guard was not installed. If he can convince the committee that their recommendation is not needed the matter is dropped but if after hearing the arguments the committee still believes their recommendation is worth while the superintendent orders it done.

This is the attitude which any plant manager must take if he expects his plant to get anywhere in safety work. It is not right for any superintendent to take upon himself the duties of a safety committee, neither should he become a jury of one and veto valuable suggestions offered by various members of the committee, merely because they might not strike him as the right move. An egotistical superintendent can take all the enthusiasm out of a committee and in turn out of the entire organization with a result that accidents will increase and a "don't care" feeling rule the plant.

*Paper delivered at the Annual Safety Conference of the Lehigh Valley Cement Mills, May 23, 1928, at Easton, Penn.

Preventing Eye Accidents

Prior to 1925 we were having a great number of eye accidents, men were being struck by flying chips of stone and steel and three men lost the sight of one eye. The committee realized that something would have to be done and done quickly if we did not want the nickname of being a one-eyed plant. So a compulsory goggle rule was put in effect in April, 1925, and each man was given a pair of goggles and a letter explaining the reason for giving them and also instructions as to when they must be worn as well as the penalty for not wearing them.

These goggles were purchased by the company at $1.10 a pair and this amount was deducted from each man when he received his pair. The company keeps the goggles in repair free of charge and when a man leaves the service his $1.10 is refunded to him providing he returns his goggles, no deduction being made for the condition of the goggles when they are returned.

At the beginning we had some trouble getting the men to wear them and we were given all the stock excuses such as, "I can't see through them," "they give me a headache," etc., but we kept driving away and each time a man turned in a pair of goggles the glasses of which were shattered by a flying chip or were covered with exploded metal we put them on our bulletin board with a full description of just how near so and so came to losing his eye sight. Such advertising proved a big help and now it is a rare case to have to call a man's attention to his goggles. We cannot say just how many eyes or lost time accidents have and are being saved by this rule, but we do give the goggles a big share of the credit for reducing our accidents.

Keeping Interest Alive

Once created, the next problem is to keep interest in safety alive and you will find that it is especially hard to do this in a plant that goes month after month without an accident. The reverse should be true but we find that after six or seven months of perfect record it takes an extra effort to keep the men's interest alive.

The Portland Cement Association through their no-accident month campaigns and the magazine bulletins issued from time to time has given us valuable aid in keeping up enthusiasm. In our opinion the monthly report on "Significant Accidents" is one of the most valuable bits of information put out by this organization. This report is given a thorough study in our committee meetings and an attempt is made to visualize each accident mentioned or in other words we imagine the injured man as being one of our men. If we then find that a similar accident is liable to occur at our plant we take immediate steps to head it off.

Each foreman is given a copy of these "Significant Accidents" and in addition to this we make out another report of the accidents which are peculiar to his department. The latter are first read and explained to the men and then posted on the department bulletin board.

We mentioned before that a safety committee is helpless unless it has the wholehearted support of the plant superintendent and in the same way the superintendent is helpless or will allow himself to become so unless he is backed up by the company management.

We of the Alpha company point with pride to the co-operation that exists within our company and I doubt whether there is a greater safety enthusiast in the country than our president. The spirit of safety is contagious only when it starts at the top and works downward. If the president of a company is a believer in safety the general manager will be also. Once the general manager is converted the superintendent will not be far behind and you will find before you hardly realize it that the foremen and men are right in line.

The Safety Bonus

The Alpha management made its plant committee's work easier when it started direct advertising by paying a safety bonus. Under this plan 1% of a man's earnings is added to his check whenever the plant goes through a month without a lost time accident. While this bonus does not amount to much for each man still it means quite an outlay for the company in a year's time for all of our plants. The average monthly bonus for each man at our plant would be about $1.25 but it is surprising how our men count on this addition and how they appreciate it. It is interesting to note the different interpretations of this bonus. One fellow will say: "As long as no one gets hurt the company will keep me in chewing tobacco," or "No one got hurt last month so I'll just let the company buy me a new shirt on pay day" and so on, each man having a different use for this safety dividend.

The Plant Doctor

It is impossible to place too much emphasis on the part played by the plant doctor in holding down the number of lost time accidents and the record we have made could not have been accomplished had it not been for our doctor.

It is a rule at our plant that every new man must be given a thorough physical examination before he is given a job and each old man is given a periodical examination. By this arrangement the unfit are kept out of our plant and a line is kept on our employees so that if anything develops which might make them unable to take care of their regular job as they should, we can transfer them to another job which they can handle safely.

The real company doctor is one in whom the men have confidence. He should be a ready and sympathetic listener to all their troubles, both real and imaginary, so that the men will be anxious to come to him for treatment. Most men think it effeminate or babish to run to the first aid room for every little scratch but the doctor can do more to correct this idea than anyone else. Infection, which may follow the most innocent looking scratch, is responsible for more lost time than any other one thing and will continue to be so unless the men can be educated to the importance of first aid.

In conclusion, I might say that the record we have made was not due to any elaborate program carried on in the plant. The methods we use are similar to those used in most plants but the success of any safety drive is a matter of co-operation and education. Convince your men that they are the real beneficiaries of this safety movement. Inculcate in them a determined winning spirit so that they will point with pride to their personal safety record, the record of their department, of their plant and of their company as a whole.

We have won a trophy and have gone 529 days without a lost time accident but they only serve as an inspiration for even greater accident prevention effort in the future and we are going to prove to the world that our adopted plant slogan, "Accidents Are Unnecessary," is something more than a mere pretty phrase.

Canadian Government Has a Way to Discourage Municipal Competition

UNDER a new regulation of the Canadian federal government, a municipality is called upon to pay a sales tax upon rock taken from its own property, crushed in its own rock crushers by its own employes and used for its own roads.

This was brought to light recently at the Victoria (B. C.) city council meeting in a communication from the council at Trail. Trail has been forced to pay sales tax on crushed stone retroactive to January 1, 1924. The support of the city of Victoria is sought by Trail in opposing this tax, which amounts to a considerable sum.

When the matter was brought up for discussion it was pointed out by the city comptroller that Collector of Customs F. W. Davey had asked him for a statement as to how much crushed stone the city had used since January 1, 1924. Mr. MacDonald gave him the circumstances under which the city procured and crushed the rock. Since then nothing has been heard from him.

It is apparent, however, from the Trail communication that the Canadian federal government has power to collect a sales tax on rock crushed by a municipality by its own plant and men and used on its own roads.—*Victoria* (B. C.) *Colonist.*

Carrying Safety From the Plant to the Community

Teaching the Families of Workers To Be As Careful As the Men in the Mills

By A. J. Eales
Safety Director, Bessemer Cement Corporation, Bessemer, Pa.

MANY CEMENT PLANTS are located in small communities, in which they are the only or at least the major industry. These communities have no chambers of commerce or safety councils to carry out drives in the interest of public safety, such as we see in the larger cities; yet the need is as great for the small as the large community.

In our plants we guard machinery, we devise safer methods, we post bulletins and hold meetings and do all that we know how to aid in preventing accidents. But a careful worker may be reckless on the highway, or his family may cause him some anxiety by carelessness on the part of the mother or some other member of the home. The advent of motor propelled vehicles on the highway brought up hazards undreamed of but a few years ago. Today we find that the man is safer in the plant than outside of it. Therefore, I have advocated that it is up to the plant safety organization to carry the work out into the community.

Education of Future Workers

Records prove to us that the new worker is the most hazardous. We draw our workers of tomorrow from the ranks of the youth of today; this makes it important that we bring the thoughts of safety upon the minds of the young people before we get them as workers in the plant.

In the larger communities the school authorities have a well laid plan of public safety, including student traffic control to care for the children in the lower grades, but often the hazards of traffic in a small community are as dangerous to school children as in the larger ones.

Putting your message over is neither complex or complicated. The average school board will gladly allow you to put a bulletin in its school, on which you can place safety messages appropriate to season and hazards. Such messages as "Learn to swim," "Cross street carefully," "No candles on our Christmas tree," "Do not hitch on to the rear of trucks," can be obtained from the National Safety Council in poster form. Then once every few months ask the school principal if you can deliver a safety talk at the school. The railroads ask their agents to do this once every twelve months during their own special "careful crossing" campaigns.

Constructive work can be effected by telling the young people what they are up against daily. Show them the method of artificial respiration, you may even demonstrate simple first-aid, or organize a first-aid team. But prevention is most important, therefore warn them against playing in the streets, of roller skating on the highway, hitching behind vehicles, of riding on the running boards of cars. If your community has street-car service, ask them to observe the signs on the cars, such as "Wait until the car stops," "Do not ride on the steps of street cars." If you have sidewalks (there are still communities without them), to use them and not walk in the streets. If they have to, they should use the left of the road so that they can see the approaching traffic. Ask them to obey the traffic officer; he is there for their protection. Do not cross intersections diagonally, or dodge in front of approaching vehicles. Ask them to observe all "Stop, look and listen" signs.

Editor's Note

MR. EALES was one of the first to advocate attention to community accident prevention by the safety organizations of the cement mills. The idea has been recognized since in many mill communities, where the safety training of the plant employes has been given to wives, children and neighbors, with a most encouraging reduction in accidental injuries in the home and on the street. Mr. Eales holds that such work is not only logical because it throws protection around those nearest to the workers, but it is also the source of much well-earned goodwill for the industry. The following paper is extracted from Mr. Eales' remarks on the subject at the Regional Safety Meeting of the Portland Cement Association at Pittsburgh, July 10, 1928.—The Editor.

Dangers to Children Playing About Quarries

You can bring your message closer home when you touch on the dangers of children being in the quarries, or of using your tracks for a playground, for this is a problem we all have to contend with. A word or two on the dangers from blasting caps will not come amiss.

A few talks in your schools along these lines will give a thought of safety to the younger generation, and when you get them in the plant as workers they will stop, look and listen to the safety signs around the plant.

Health of Workers

You are interested in the health of your workers, knowing that a well man is a better and more careful worker; a well man must be free from worry, therefore you should have some concern as to his home conditions. Why not go a step farther and get a message over to the caretaker of the home once in a while?

Frequently you have general safety meetings at which you often get an out-of-town speaker. Allow the men to bring their wives and see that part of the safety message applies to the home. Bring out the point that safety is as important in the home as on the job, and that industrial compensation for injury does not cover home accidents.

A man's greatest thought should be for the protection of his children. Man will sacrifice for their sake, yet practicallly all accidents to children are the fault of parents or other adults. Carelessness, neglect, disorderly habits and thoughtlessness on the part of adults cause more accidents in the home than do the same causes in industry. Estimates of home accidents are always difficult to make and it is not easy to get figures or facts that occur within the doors of a man's castle, but from conservative estimate it seems likely that there are at least as many deaths from accidents in the homes as from industrial accidents. We can safely say that if the average man took half the risks on the job as his wife does in the home he would be discharged as a careless worker.

Curiosity in the child leads it into dangerous paths and it is up to the adult to show how to do things safely.

Hazards of the Home

Let us look over a few of the hazards that are common in the home, for too often we think of the home as the safest place in the world. Heading the list are falls. How

many children have been permanently injured by a fall downstairs when a simple gate or barrier might have prevented it? Next on the list is burns and scalds. Only a few days ago I read in our local paper of a 2-year-old child falling into a pan of hot water and being scalded fatally. One can frequently go into a home and find a tub of scalding water or other hot liquid on the floor, or a hot kettle within easy reach of a small child; the toll of lives lost through children falling into scalding liquids is high. Asphyxiation and suffocation come next on the list. Badly ventilated rooms, or the need of fresh air cannot be stressed too strongly. Next is poisons. Receptacles containing poisons should never lie around, and a good suggestion is that a small bell be placed around the neck of bottles containing poison, a warning in the dark. Apparently harmless household cleansers often contain poisons or burning acids and should be kept out of the way of children.

Fires and explosions are the next item. Small communities are not usually well protected against fire. Fire destroys more than half a billion dollars worth of homes a year, and almost all these fires are preventable. Carelessness with matches, the handling of gasoline, allowing combustible rubbish to accumulate cause most of these fires, and you do your community and yourself a benefit if you can prevent a fire, for destruction of one building affects the insurance rates of all. Greater risks must bear higher rates.

Firearms is the next on the list. A gun is a dangerous plaything for an adult, but more so as in the case I read of last week in which a 21-months-old babe accidently shot its mother. She had given it to the youngster to play with, "not knowing it was loaded." Some mothers give their children almost anything to play with. You cannot stress too strongly the fact that the child will put anything into its mouth and that small objects should never be given to children. Daily we read of children dying from the swallowing of small objects. The child will copy its mother, who should never put buttons, pins or other sewing materials in her mouth. Nuts and nut candy should never be given to small children; they cannot chew the nuts and are liable to choke on them.

Mothers should be reminded that it is dangerous to leave sharp articles lying around; that sharp shears, tools, razors, etc., should be put out of reach of little children.

Electricity is one of the safest methods of producing light, heat and power, but it must be properly installed and handled with reasonable care. A fuse is a safety factor and if one blows out, don't try to doctor it up with a wire or a piece of copper.

All these things can be touched upon, and since the average family owns a car the need of safe motoring should be brought out.

Safety Meetings for the Family

If you live in a large community, be associated with the local safety council. If your community is small, the case is largely one of individual effort and can best be brought about by bringing the family to the safety meetings, or arranging safety meetings for the family. But be sure not to neglect the school approach to this movement, as the child of school age may be the only means of getting it over to the parent.

Make Accident Campaigns Community Affairs

Many plants make the no-accident month a community affair. Whatever method you take, make your general safety activities go beyond the plant. Often your campaigns are of as much interest to the townspeople as to the plant employes. The local butcher, baker or grocer does not want to see any of his customers hurt, for it often means delayed payments of accounts and often losses. Such remarks as "I see the safety flag is still flying at the cement plant" are common. Make everyone interested in your record. Usually the community is interested in you, and you should be interested in the community.

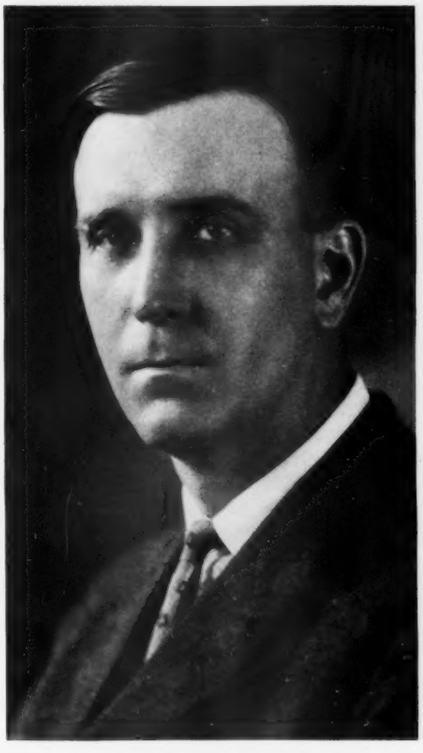
You can outlaw accidents by creating a sense of safety in your town, and when the safety seeds have been sown, the new workers coming into your plant will be safety men from the very start.

Prevention of Yard Accidents at Cement Plants

By J. R. Cline

Assistant Superintendent, Universal Portland Cement Co., Universal, Penn.

A YARD DEPARTMENT, as we know it, consists of a foreman and a group of common laborers required to keep the mill property in order, maintain all railroad tracks, provide proper drainage of all storm waters and sanitary sewage, load into and load from stockpiles of materials not continuously used in mill operation, and, in fact, do most any kind of work outside the mill buildings proper that is necessary for the proper operation of any plant.



J. R. Cline, assistant superintendent at the Universal, Penn., plant of the Universal Portland Cement Co.

The foreman of this department must be able to train his men to work safely both individually and as a group. The nature of their work is such that very seldom any one of them is at the same place two days in succession or does identically the same work day after day. This is entirely different from the mill organization of the operating, mechanical or electrical departments, whose men have their regular routine work to do and can become thoroughly acquainted with all the hazards of their particular job and the place in which they work.

A car may jump the track and tear up a section. The yard gang is immediately gathered and they have to work hurriedly, helping to get the car back on the track and repair the section torn up. Here there are many dangers. Replacing the car on the track presents many hazards, while in repairing the section the heavy lifting of ties and rails where each man must do his part or possibly injure the whole gang.

Organization of the Yard Gang

Ordinarily the yard gang may be divided in many groups—a few individuals cleaning certain areas assigned to them, a small group of two or three cleaning out some blocked drain, another group of two or three with a truck cleaning up piles of refuse gathered by individuals working certain areas, and still another group of four or five maintaining the railroad tracks in some far corner of the plant.

Each of these groups is exposed to many hazards—the cleaners to objects that may fall off or out of buildings, cuts from sharp objects left about, being hit or run over by trucks, mill buggies or trains, and coming in contact with mechanical or electrical hazards outside the mill buildings. The track maintenance group encounters all the hazards of hand tools, picks, shovels, sledges, wrenches, in addition to dropping objects and

flying particles when driving spikes or swinging picks. Men working as this group have to be careful they do not injure someone else or are injured by another. The carrying of tools to and about the job is a very important feature. A man walking along with a pick over his shoulder, points lying horizontal, turning his head one side to talk to fellow workmen, can seriously injure workmen walking along on his other side by bumping his head with the point of the pick.

The foreman of the yard department must develop loyalty and trustfulness of every man in his department, to him and the company more so than any other department of the plant. The nature of their work causing them to work individually or in small groups at various places about the plant where only occasionally seen by their foreman calls for real loyalty and trustfulness that they will do their work as it should be done without constant supervision. The foreman must also confer often with the foremen of all other departments about the plant to learn from them if his men are doing the work in their neighborhood to the satisfaction of all.

Importance of "Good Housekeeping"

One of the greatest factors affecting the yard department safety record is good housekeeping. This, of course, applies to all departments about the mill. The proper piling of material, well defined passageways, general cleanliness of premises and employes and proper wearing apparel. Along this same line proper headquarters for the yard department is very essential. Good roomy quarters, where the gang meets the first thing every morning to receive their instructions for the day, where they all can sit down comfortably and eat their lunch at the proper period or hold their safety meetings under pleasant conditions are very essential. The headquarters should have provision made for the proper care of all tools, racks for holding picks, shovels, bars, forks, sledges or whatever used, as well as appliances for making minor repairs to tools. Foremen should constantly inspect tools to see that they are kept in proper condition and scrap all tools that have outlived their usefulness.

Proper storage facilities should be provided in the yard for the storing of yard and track material so it presents a good appearance and is where it can be found when needed. All this is necessary so every man in this department has the proper way to do things impressed upon him right in his own headquarters as an example for him to follow in whatever part of the plant he may be working.

Typical Yard Accidents

The Portland Cement Association in its classification of accidents has recently listed the following accidents that have occurred in yard departments. They do not all fall in that classification according to the definition of a yard department as mentioned at the start of this paper, but from each to be mentioned a good lesson can be learned and a word of caution issued to your yard men.

Working on crane, man caught first finger of left hand between bolt and shaft, causing amputation of part of first finger. No time was lost on account of this accident.

Crane engineer had end of little finger crushed, requiring amputation at first joint, when heavy ring gear slipped from position where it was being held by bar.

Pipe fitter opened a dust line to locate an obstruction. While looking into pipe, wad loosened and blew into his face, driving him against concrete wall. Skull was fractured and one eye destroyed.

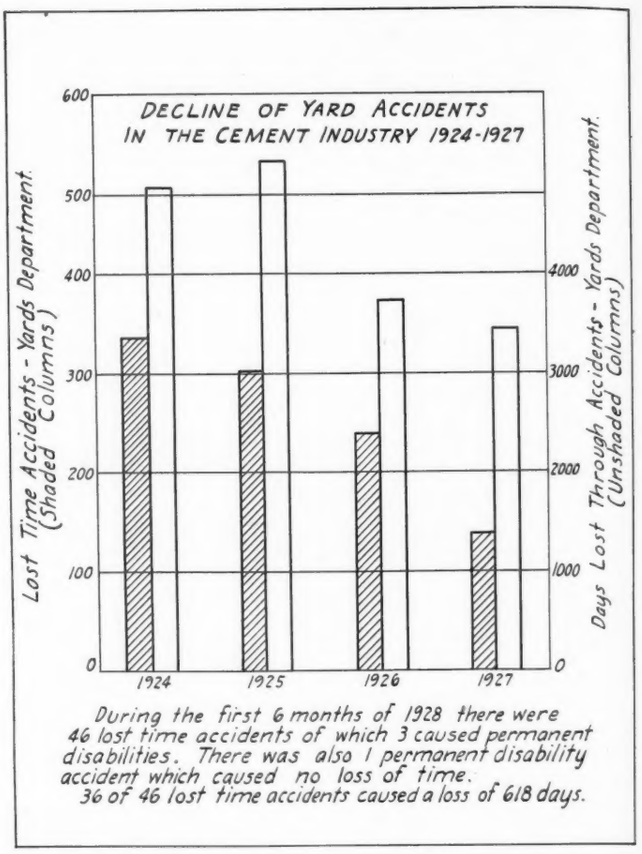


Chart showing the number of yard accidents and days lost in the past few years

Teamster hauling timbers on stone boat received compound fracture of left leg above ankle when stone boat caught in railroad crossing throwing man's leg between stone boat and rail.

As driver jumped into truck (with engine running) foot struck clutch, throwing it into high gear. Driver was thrown out, rear wheel passing over him and pinning him against wall. He suffered contusions of chest, back, hips and fracture of left ankle.

Laborer walked up close to where man was moving a barrel. The latter fell on laborer's foot, breaking bones.

Our own plant at Universal, as well as every other mill in the cement industry I am sure, has organized against accidents as never before. By reason of their opportunity to get over the mill property a great deal yard men see many of the mill accidents, and our yard men are particularly alert in removing various hazards and in warning others. We are delighted with the modern spirit of these men in considering themselves very much as custodians of the men and the property.

Three yard accidents which occurred in the cement industry during June emphasize the constant need for common sense. These accidents were reported as follows:

Electrician fell 15 ft. when upper section of electric light pole collapsed under his weight. He should have remained on his ladder. Back injured.

While unloading coal drayman stepped backward with shovel of coal, falling over a piece. He strained knee muscles—20 days lost.

Spinning of brake wheel caused laborer on car to lose balance, falling to track, fracturing leg and lacerating hip.

None of these accidents are what might be called "process accidents." None of them had anything to do with the particular process of making cement. All of them might have been prevented by the use of a little more care—just a little more deliberation and common sense.

Record of Actual Yard Department Accidents

Accidents to members of our own yard department, we are glad to report, have been very few and we hope their record will continue clean for a long time to come. The last lost-time accident occurring in this department was in 1922. In that year one man lost five days on account of stepping on upturned nail in a board, receiving a puncture in the foot. The year previous to that (1921), the department had three lost-time accidents. The first was to the foreman of the department. We had just been using a cement gun a short time and a block-up occurred in the line. The air pressure was not shut off, and the foreman in looking over the hose was right at the spot where a blow-out occurred, getting cement and sand

in his face and eyes. He was rushed to the hospital, and returned to work after losing only five days. Next a man was struck in the eye with a piece of concrete while chipping. Twelve days were lost on account of this accident. Under remarks on the report of this accident is the whole story—"Disregarding safety rules—no goggles." The third lost-time accident of the yard department that year was caused when a man walking alongside a push car jumped on the car as it came to a slight down grade, expecting to get a joy ride. When near the place he wanted to get off he jumped while car was in motion, stumbled and fell, receiving a fractured right clavicle. His "joy ride" cost 54 days lost time.

As a means of preventing accidents occurring in the yard department, it is our job to develop foresight and teach each individual to foresee the possibility of accidents occurring; if we do that job well enough, every man will think before he acts, and the results will be no accidents.

Quoting from "Safe Practice Recommendations" of the Pennsylvania Department of Labor and Industry: "While most of the recommendations set forth are merely common sense, nevertheless the accident records indicate that it is only through the constant exercise of common sense that material reduction of industrial accidents will be secured."

International Cement Cartels

(Taken from the *Polish Economist*, a Semi-Official Publication)

THE CEMENT INDUSTRY of Europe is at present making attempts at international consolidation. The production of every cement exporting country exceeds its home consumption capacity by 50%, therefore new outlets are sought abroad on the markets of countries which have an insufficient supply of cement.

The international market is the field of tremendous competition between cement producing countries and therefore a situation is created whereby cement importing countries buy cement, in spite of the heavy transport charges, at a price lower than the home price of the exporting states. The price which the countries receive for their exported cement is so low that it does not cover, in many cases, the net cost of production, to say nothing of amortization, overhead charges and interest on capital outlay. Nevertheless, factories are bound to keep up this export, since it is the only way in which they can secure constant output, without the risk of shutting down for half the year. The consequence of a shutdown is the paying off of all trained workers and the necessity of finding them again when activity is renewed. A workman who is aware of the seasonal nature of his occupation will not work as well as a man who has a steady job and can see a future in the factory he works for. Moreover the inaction of a factory entails a series of expenses which count against the period of actual work.

These reasons are the source of the efforts made on behalf of consolidation in the cement industry, both within the country and without. Thus, during the last months the German cement industry has concluded a number of agreements with foreign cement-manufacturing groups, partly renewing former pre-war agreements and partly adapting others to the changed conditions on the world markets.

The most important of these international agreements is that between Germany and Belgium. It treats of mutual protection of the respective territories, and takes into account a question of great moment to Germany, that of the Dutch market. The agreement is concluded for one year only, yet the fact that between Germany and Belgium an understanding has been reached with regard to the Dutch market should be considered a step forward in the march of European consolidation.

The Belgian cement industry is very strong, in view of the considerable home consumption and the well regulated overseas export based on long years of experience. Moreover, Belgium reached an understanding with France in December, 1927, whereby one more strong competitor was written off the list as regards the Belgium industry. The Swedish and Danish cement industries for several scores of years have worked together with the German industry, everywhere avoiding competition.

[The above information is further reason for an import duty on cement brought into the United States.—The Editor.]

British Columbia Producer Active in Several Lines

GILLEY BROS., Ltd., New Westminster, B. C., pioneers in the building material supply business, are as busy as ever in all branches of a diverse trade. Their quarry at Pitt lake is being worked steadily by a considerable force and if there has been less building stone and one-man rock required so far this season, there has been no diminution in the demand for crushed rock. Much of this is supplied indirectly to the municipality of Richmond for hard-surfacing roads. The demand for sand and gravel is steady and being largely met from this firm's own resources, and cement comes by the shipload from the Bamberto plant of the British Columbia Cement Co. Recently the *Mary Taylor* brought 1800 sacks and the *Teco* 7000 sacks. Half the latter cargo will go into the foundations for the new grain elevator. The Burnaby sewer construction is absorbing considerably of these raw materials and the city of New Westminster is taking a huge quantity of gravel for filling where Columbia street is being widened. Through the Freshwater Sand and Gravel Co. much fine gravel is being got from the Fraser above Mission. Messrs. Gilley keep a fleet of six steamers and 20 scows busy hauling material to their bunkers.—*New Westminster* (B. C.) *British Columbian.*

Federal Money for Highway Building

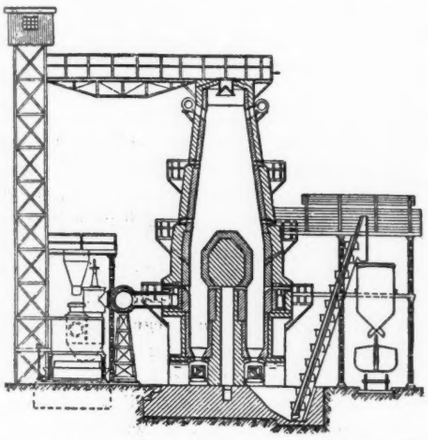
THE ALLOCATION of federal funds for 1929, 1930 and 1931 road construction in the United States and Hawaii has been made by the United States Bureau of Public Roads. There may be a few minor corrections in the apportionments for 1930 and 1931 as a result of mileage revisions. With the exception of 13 states in which more than 5% of all land is non-taxable, the states must finance at least 50% of federal aid road costs, and in no case will the government contribute in excess of $15,000 per mile.

The apportionment to each state and Hawaii, and the minimum which may be expended on the same roads by the states, for each of the years 1929, 1930 and 1931, is as follows:

STATE	FEDERAL APPORTIONMENT	MINIMUM STATE SHARE
Alabama	$ 1,547,483	$ 1,547,483
Arizona	1,059,081	404,951
Arkansas	1,281,785	1,281,785
California	2,486,415	1,893,659
Colorado	1,383,401	1,083,484
Connecticut	474,213	474,213
Delaware	365,625	365,625
Florida	901,311	901,311
Georgia	1,980,015	1,980,015
Hawaii	365,625	365,625
Idaho	932,962	628,481
Illinois	3,135,225	3,135,225
Indiana	1,921,463	1,921,463
Iowa	2,035,291	2,035,291
Kansas	2,062,196	2,062,196
Kentucky	1,421,029	1,421,029
Louisiana	1,019,282	1,019,282
Maine	681,431	681,431
Maryland	634,906	634,908
Massachusetts	1,088,808	1,088,808
Michigan	2,209,596	2,209,596
Minnesota	2,112,595	2,112,595
Mississippi	1,309,729	1,309,729
Missouri	2,404,347	2,404,347
Montana	1,552,576	1,199,064
Nebraska	1,584,981	1,584,981
Nevada	957,995	134,115
New Hampshire	365,625	365,625
New Jersey	935,122	936,122
New Mexico	1,189,361	685,715
New York	3,629,879	3,629,879
North Carolina	1,715,910	1,715,910
North Dakota	1,193,440	1,193,440
Ohio	2,757,964	2,757,964
Oklahoma	1,749,066	1,405,815
Oregon	1,189,707	1,404,109
Pennsylvania	3,333,786	3,333,786
Rhode Island	365,625	365,625
South Carolina	1,059,533	1,059,533
South Dakota	1,223,981	976,632
Tennessee	1,612,012	1,612,012
Texas	4,502,576	4,502,576
Utah	848,093	226,803
Vermont	365,625	365,625
Virginia	1,437,548	1,437,548
Washington	1,143,226	962,152
West Virginia	793,796	793,796
Wisconsin	1,864,212	1,864,212
Wyoming	939,547	524,068
Totals	$73,125,000	$66,016,664

Foreign Abstracts and Patent Review

Modern Lime Kilns. A lime kiln of an interesting type from the point of view of production and consumption of fuel recently commenced work at the late National Nitrogen Works of Chorzow (Upper Silesia). It is a shaft kiln comprising an inner central part or core for heating with a coal gas producer. The height of the kiln is 25 meters (82 ft.), the diameter at the mouth 3 m. (9.8 ft.) and the largest diameter at the zone of combustion 6 m. (19.6 ft.). The maximum diameter of the core is 4.3 m. (14 ft.), thus leaving a space between the core and lining of the kiln of 0.88 m. (2 ft. 10 in.). In the cooling section of the kiln the diameter of the core is reduced to 3.4 m. (11 ft.), so that the free space is then 1.30 m. (4 ft.). The total capacity of the kiln, the core being deducted, is 290 cu. m. (377 cu. yd.). There are six openings to draw the kiln 0.6x0.7 m. (23x27 in.) regularly arranged at the exit from the cooling section. Each opening is closed with a folding trap. The lime is drawn out automatically and continuously. There is an endless track in the space below the drawing openings on which an electric truck runs and opens each trap as it moves forward. The lime falls into the truck and the trap shuts automatically. The length of time during which the trap is open can be regulated as required, as also the speed of the truck, to increase production. The lime is automatically discharged from the truck into a pit from which it is carried by a bucket chain to the silos. The lime is then put on the trucks through traps opened by hand. The gas is made from coal, giving 7,000 calories, in a producer with a revolving grate, 3 m. (9 ft. 10 in.) inner diameter. Hitherto, as far as the writer knows, no gas fired lime kiln has been built for a daily production of 75 metric tons (73 tons 16 cwt. 1 qr.) of burnt lime daily, and consequently measures had to be taken in building to provide for sufficient heat. For this purpose the kiln can be heated both by the outer wall and the core and there is a circular passage built with refractory bricks for this object. The gas passes from the producer to a dust collector with an intervening wall, and then when the valve opens to the circular passage. A pipe is branched on this passage, outside the kiln, also with a valve which runs to the core and crosses one of those between the traps. The walls of the kiln and the core start on the same level with the horizontal gas nozzles on the circumference, through which the gas form the circular passage or a vertical passage made in the axis of the core, penetrates into the kiln and burns after addition of air previously heated to 100 deg. to 300 deg. C. in the kiln wall or core. After being heated by the waste heat from the lime in the cooling section the air enters the kiln through six regular vents. Hitherto this kiln has worked with the two systems of heating, but now endeavors are being made



Cross-section of an unusual shaft line kiln

to dispense with core heating, gradually cutting off the intake of gas; but it appears that heating by the walls is not enough. The soot from the flues can easily be burnt without danger. The refractory power of the chamoth bricks corresponds to the Segar cones No. 32 to 33 and in the pre-heating and cooling see sections to cone No. 30. The bricks must be very resisting and well burnt to withstand friction of the limestone,which is very hard. The pre-heating chamber is spacious and the stone reaches the burning section in good condition and the gases are well utilized. After working for six or eight weeks the consumption of coal did not exceed 13 to 15%, the production of burnt lime, viz., 7 to 8 % of the charge. More still can be done. For a production of 75 metric tons in 24 hours, 10 to 11 tons of coal at most, are consumed. A gas producer with 22 tons would thus suffice for two kilns. The limestone employed has an average diameter of 100 to 200 mm. (1.9 to 7.8 in.). The percentage of dust is hardly 1% the production.

About 1% CO_2 is left in the lime, so that it is well burnt. The limestone is raised to the platform at the kiln mouth by an electric hoist and carried to the kiln. The same hoist also feeds the gas producer. The trucks are of the tipping type and contain 1200 kg. (1.17 ton). The kiln mouth is thermatically shut with a double door balanced by counterweights. The production of this kiln can attain 80 to 90 metric tons (78 tons 14 cwt. to 88 tons 11 cwt.) per 24 hours.—*Stone Trades Journal* (May 1), 1928.

Burning Process in the Automatic Shaft Kiln. Upon the basis of his tests, Prof. Dr. H. Kuehl arrives at the following conclusions: Even though the fact that carbonic acid from the pulverized raw material and the briquetted fuel are able to react with each other from about 500 to 600 deg. C. (932 to 1112 deg. F.) upward cannot be denied, this reaction is not of decisive significance in the burning of the briquetted fuel and cement material in the automatic shaft kiln. The burning of the fuel pressed into the raw cement material briquette takes place by the direct influence of the atmospheric air upon the burning fuel in a temperature zone which lies far above the dissociation temperature of the calcium carbonate. The burning speed of the briquetted fuel is first of all dependent upon the prevailing temperature and obviously less upon the size of grain of the burning material. The diffusion process within the highly heated raw stone appears to be so active that the size of the briquette is likely not to be of decisive significance in the rapidity of the burning process.—*Zement* (1928), No. 22, pp. 859-862. Pl.

Suitability of Volcanic Ash for Producing Hydraulic Mortar. H. Brintzinger and W. Brintzinger tested the ashes of the volcano Acatenango in Guatemela, preparing various mixtures by the addition of purest burned lime and, set with the same quantity of water, striking it off in forms and then subjecting it to the prescribed tests for strength of compression. The compressive strengths were found to be from 68 to 114 kg. per sq. cm. (967 to 1621 lb. per sq. in.), and accordingly such mixtures cannot be used for high-grade mortar. The 0.5% sulphur content of the mixtures oxidizes through the influence of air and moisture to sulphate, which forms calcium-aluminium sulphate with free calcium oxide still present and aluminium hydrate of the mortar. Since this reaction, which includes a change in volume, takes place only at some time after the setting and hardening of the mortar, it causes the appearance of blooms, which, with larger quantities of sulphur in the raw material, could lead to crack formation, and in smaller quantities it could still lead to a considerable subsequent decrease in the strength of the mortar. In test samples, which had lain 15 months in a damp atmosphere, the strength had decreased 15 to 20%.—*Zeitschrift fuer anorg. und allg. Chemie* (1927), Vol. 168, pp. 93-95.

Empire State Sand and Gravel Men Meet in Buffalo

THE regular July meeting of the Empire State Sand and Gravel Association was held at the Buffalo Athletic Club in Buffalo on July 20. The association met as guests of D. Hyman, president of the Buffalo Gravel Corp. and also president of the association. The meeting was well attended by producers of the western part of the state, but few were present from the center or eastern portion. This situation brought up considerable discussion as to how to attract a larger group to the meetings, and it was suggested that to have the meetings less frequently might aid the situation. No decision on a change in frequency of the meetings was reached, however.

After an excellent lunch, Charles R. Waters, district engineer of the New York State Department of Public Works, Buffalo, N. Y., presented the main talk of the meeting with a full discussion of the highway engineer's attitude toward various types of paving aggregates, and a brief outline of the construction methods now being used in the building of the department's new type of two-course pavement. In conclusion, he pointed out the responsibility for good roads, which rests on the shoulders of aggregate producers as well as on the contractors and engineers. (The full text of Mr. Waters' paper will be published in an early issue of ROCK PRODUCTS, as it is certain that the message contained therein is well worth reading by all the men of the industry.)

As at the previous meeting, there was a discussion of the uniform credit system for all plants, which the New York Chapter of the Associated General Contractors is advocating. J. G. Carpenter, Madison Sand and Gravel Co., Hamilton, N. Y., secretary of the association, outlined the use of the credit system in use by the Madison company. J. E. Carroll, of the J. E. Carroll Co. of Buffalo, was inclined to feel that such an idea would not work in a competitive area such as the Buffalo district.

After the luncheon the members adjourned to the plant of the Buffalo Gravel Corp. to inspect the new plant with its remarkable conveyor system. H. A. Stelly, of the Buffalo Gravel Corp., showed the visitors over the whole layout. An inspection trip across the new International Peace Bridge to Canada as guests of Mr. Hyman was also made by some of the members, and a stop on the far side was made at Mr. Hyman's country club.

Building Construction in Chicago Breaks All Records

CHICAGO'S BUILDING CONSTRUCTION curve is on the upgrade, according to complete reports on July building permits compiled by S. W. Straus and Co. The total last month of $29,013,500 represented a gain of 41% over July of last year and a record for the last seven years. This is described as significant in view of the fact that the first half of the year showed a loss as against the first half of 1927. The July total also was 12% ahead of the June, 1928, total of $25,705,550.

The July record this year, in comparison with the same month from 1922 to 1926 inclusive, shows consistent gains as follows: As against 1926, 14%; 1925, 1%; 1924, 48%; 1923, 75%; 1922, 78%.

The first seven months of 1928 showed a record of $209,913,550, a figure 5% under the seven months of last year, but 2% ahead of the seven-months record of 1926.

Comparative figures for July for the last seven years are as follows: July, 1928, $29,013,500; 1927, $20,437,950; 1926, $25,394,800; 1925, $28,502,400; 1924, $19,545,900; 1923, $16,495,150; 1922, $16,214,300.—*Chicago* (Ill.) *Journal of Commerce.*

Receiver for Oregon-Idaho Lime Products Company

ON APPLICATION of Henry Hahn, creditor and stockholder, and with the consent of the board of directors, Presiding Circuit Judge Ekwall recently appointed H. T. Humphrey as receiver for the Oregon-Idaho Lime Products Co. to enforce the rights of the creditors, protect the interests and property of the company, and to secure so far as possible the performance of the duties the company owes its creditors and stockholders.

The company was formed for the purpose of taking over the Idaho Marble Co., which has extensive holdings near Agatha, Idaho. The deal was never consummated, according to the complaint, because H. P. Wanner, president of the Idaho Marble Co., absconded, leaving both companies in a perilous financial condition. A large part of the company obligations are unpaid, including $19,500 due on a bond issue of the Idaho Marble Co., and other debts and liabilities aggregating $75,000, the complaint sets forth.—*Portland* (Ore.) *Journal of Commerce.*

United States Gypsum Co. Wins Another Patent Infringement Suit

A DECISION upholding alleged patent infringement was granted United States Gypsum Co. in a suit against the American Gypsum Co. of Port Clinton, Ohio. The case has been pending since 1921 and was tried in the United States district court by Judge John Paul Jones. Judge Jones, after granting the suit, referred the case to the master in chancery for determination of money damages.

Infringement upheld was that of Birdseye patent No. 1,358,508, which covers a certain type edge for gypsum wall board. Originally American Gypsum Co. contended that it was the possessor of the patent and sued the United States Gypsum Co. for alleged infringement. The suit was denied, however, in District of Columbia court of appeals.—*Wall Street Journal* (New York City).

Plea for a stay of injunction in the suit brought by the United States Gypsum Co. against the American Gypsum Co. of Port Clinton, Ohio, was denied by Judge John Paul Jones in the United States District Court at Cleveland. The suit was brought for alleged patent infringement in the manufacture of gypsum wallboard. Judge Jones ordered the American Gypsum Co. to cease manufacture by August 9 of the type of wallboard covered by the patent.—*Chicago* (Ill.) *Daily News.*

Vermont Slate Men Have Real Outing

THE annual get-together outing of the Vermont slate industry, which was held on Saturday, June 30, was bigger and better in every way than any of the previous outings. The Prospect House, at Lake Bomoseen, Vt., was the scene of this year's affair, which was sponsored, as were the earlier outings, by the National Slate Association.

During the day Gene Lyng's ball team from the Rising and Nelson Co. defeated George Young's club from Fair Haven and Poultney, by a score of 6 to 3, and thereby won permanent possession of the cup offered for two wins in three years. Jim Hinchey, general chairman for the outing, took the golf trophy for the lowest score for nine holes, and Judge Pratt won the award for low score for 18 holes. To complete the athletic competition, the Woman's Auxiliary played some fine bridge during the afternoon.

At the evening dinner, Benjamin Williams, of the Vermont Marble Co., acted as toastmaster, and introduced Judge E. B. Raymond, Mr. Olney of the Associated Industries of Vermont, Mr. McVey of the Rutland railroad, who is also vice-president of the National Slate Association, and W. H. Smith of the North Bangor Slate Co.

Richard Griffiths (Penrhyn Slate Co.) was named general chairman of the 1929 outing and Jim Hinchey (Hinchey Consolidated Slate Co., Inc.) and the committee were thanked for the 1928 outing.

The Vermont outings are yearly becoming more important in bringing together those within the slate industry and their friends in other fields. They contribute recreation and pleasures that are most enjoyable. The beautiful Lake Bomoseen and motor trips are memorable features and the slate producers, distributors and contractors from other parts of the country are coinciding their business and inspection trips to the Vermont quarries with this annual event, taking their families with them for an outing at a delightful spot. Mr. Griffiths has promised some new and unusual features for the 1929 outing.

Traffic and Transportation

Car Loadings of Sand and Gravel, Stone and Limestone Flux

THE following are the weekly car loadings of sand and gravel, crushed stone and limestone flux (by railroad districts) as reported by the Car Service Division, American Railway Association, Washington, D. C.:

CAR LOADINGS OF SAND, GRAVEL, STONE AND LIMESTONE FLUX

District	Limestone flux Week ended June 30	Limestone flux Week ended July 7	Sand, stone and gravel Week ended June 30	Sand, stone and gravel Week ended July 7
Eastern	3,699	3,095	14,884	12,948
Allegheny	3,688	2,885	9,703	8,318
Pocahontas	702	665	845	759
Southern	565	488	10,764	10,530
Northwestern	1,906	2,202	8,175	7,670
Central Western	430	407	12,860	12,361
Southwestern	438	348	7,274	6,918
Total	11,428	10,090	64,505	59,504

COMPARATIVE TOTAL LOADINGS, BY DISTRICTS, 1927 AND 1928

District	Limestone Flux Period to Date 1927 July 9	Limestone Flux Period to Date 1928 July 7	Sand, Gravel and Stone Period to Date 1927 July 9	Sand, Gravel and Stone Period to Date 1928 July 7
Eastern	83,052	69,563	209,016	200.870
Allegheny	92,415	83,348	179,012	152,663
Pohacontas	11,905	10,913	20,788	19,485
Southern	14,490	14,872	306,607	271,164
Northwestern	35,701	30,817	154,645	137,177
Central Western	13,128	10,805	221,510	237,904
Southwestern	8,212	11,069	138,118	148,310
Total	258,903	231,387	1,229,696	1,167,573

COMPARATIVE TOTAL LOADINGS, 1927 AND 1928

	1927	1928
Limestone flux	***258,903***	***231,387***
Sand, stone, gravel	***1,229,696***	***1,167,573***

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning July 28:

SOUTHWESTERN FREIGHT BUREAU DOCKET

15278. **Sand and gravel,** from Oklahoma points to points in Arkansas. To establish rates on sand and gravel, carloads, minimum weight 80,000 lb., if marked capacity of car is less than 80,000 lb. marked capacity of car will govern, from Byllesby, Ft. Gibson, Keough, Kriener, Leake, Muskogee and Verkney, Okla., to points in Arkansas on basis of I. C. C. Docket No. 9702 scale. In view of a considerable amount of road work being contemplated in Arkansas, it is thought a reasonable basis of rates should be in effect from the shipping points mentioned above.

15300. **Sand and gravel,** from Oklahoma points to points in Arkansas. To establish rates on sand and gravel, carloads, minimum weight 80,000 lb., or if marked capacity of car is less than 80,000 lb. marked capacity will govern, from Addielee, Christie and Westville, Okla., to Appleby, Farmington and Prairie Grove, Ark., on basis of the Docket 9702 scale. It is stated that points of origin are just west of Westville, Okla., from which the Docket 9702 scale is now applicable.

15315. **Sand,** from points in Illinois to points in Oklahoma and Texas. To establish the following rates in cents per 100 lb. on sand, carloads (See Note 2), from Ottawa and Utica, Ill., to points shown below:

To Okla. pts.	Rates	To Okla. pts.	Rates
Bartlesville	16	Frederick	23
Vinta	16	Waurika	23
Claremore	17	To Texas points	
Wagoner	17	Ft. Worth	25
Ponca City	18	Dallas	25
Blackwell	18	Amarillo	25
Enid	18	Quanah	25
Okmulgee	18	Denison	25
Tulsa	17	Tyler	25
Muskogee	17	Wichita Falls	25
Sapulpa	17	Sweetwater	27.5
McAlester	19	Austin	27.5
Oklahoma City	19	Galveston	27.5
Chickasha	20	Beaumont	27.5
Ada	20	Three Rivers	27.5
Durant	21	San Antonio	27.5
Ardmore	21	Houston	27.5
Clinton	22	Waco	27.5
Hobart	22	Laredo	32
Lawton	22	Brownsville	32
El Dorado	23	El Paso	32

It is stated that Illinois sand shippers cannot compete under the present system of rates with producers in Arkansas and Missouri, nor are they able to compete on a fair basis with rates which represent the sum of locals.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

15330. **Sand and gravel,** from points in Oklahoma to points in Arkansas. To establish rates on sand and gravel, carloads, minimum weight 80,000 lb., or if marked capacity of car is less than 80,000 lb., marked capacity will govern, from Addielee and Christie, Okla., to Appleby, Farmington and Prairie Grove, Ark., on basis of the I. C. C. Docket 9702 scale. It is desired to place the above points on competitive basis with Baron, Okla., from which point the I. C. C. Docket 9702 scale now applies.

15362. **Crushed stone,** from points in Texas to points in Louisiana. To establish the following rates in dollars and cents per ton of 2000 lb., on crushed stone, natural, carloads, ranging in size up to 20,000 lb. in weight, 25 tons of 2000 lb. per car, except where marked capacity of car is less, in which event the marked capacity shall govern, from Dittlinger and New Braunfels, Texas, to Louisiana points shown below:

To—	Rates	To—	Rates
Alexandria	$3.50	Lake Charles	$2.67½
Anchorage	3.40	New Iberia	3.16
Baton Rouge	3.40	New Orleans	3.50
Crowley	2.91½	Opelousas	3.16
De Quincy	2.67½	Patterson	3.40
Franklin	3.28	Porte Barre	3.28

Shippers have requested the publication of same rates from Dittlinger and New Braunfels, Texas, to competitive points on the Gulf Coast Lines in Louisiana as are contemporaneously in effect from Knippa, Texas, to points on the T. & N. O. R. R.

NEW ENGLAND FREIGHT ASSOCIATION DOCKET

15001. **Gravel and common sand,** carloads (See Note 3), to Rutland, Vt., from Milton, N. H., $1.80; from Scarboro Beach, Me., $1.85 per net ton. Reason—To establish commodity rates comparable with those now effective for similar distances.

15034. **Gravel and common sand,** carloads (See Note 3), from Topsfield, Mass., to Manchester, Vt., $1.80 per net ton. Reason—Comparable with rate now effective for similar distance.

CENTRAL FREIGHT ASSOCIATION DOCKET

18964. To establish on **raw** or **crude dolomite,** carloads, from McVittys and Carey, O., to Ashland, Ky., rate of 166c per gross ton. Present rate, 156c per gross ton.

18966. To establish on **sand and gravel,** carloads, from Kern, Ind., to Champaign, Ill., rate of 80c per net ton. Route via C. C. C. & St. L. Ry., Illinois Terminal R. R. System. Present rate, 85c per net ton.

18967. To establish on **sand, refuse, molding** or **foundry,** carloads, minimum weight 50,000 lb., from Bremen, Ind., to Canton and Toledo, O., rates as shown below (Present rates, sixth class—cents per 100):

To	Pres.	Prop.	To	Pres.	Prop.
Canton	22	189	Toledo	18	180

18975. To amend Item 1220 of C. F. A. L. Tariff 130R, naming 60% of sixth class rating on **agricultural limestone, limestone screenings,** etc., carloads, from Milwaukee, Wis., to Central Freight Association territory and 70% of sixth class rating to Canadian Freight Association territory via Chicago, to provide for the same ratings from intermediate stations on the M. St. P. & S. S. M. R. R. between Chicago and Milwaukee. Present rate, classification basis.

18976. To establish on **crushed stone,** carloads, from Melvin, O., to Washington Court House, O., rate of 50c per net ton. Present rate, 60c per net ton.

18978. To establish on **sand and gravel,** carloads, from Marietta and Gravel Bank, O., to Radcliffe, Clarion and Minerton, O., rate of 100c per net ton. Present rate, 140c per net ton.

18979. (2). To establish on **sand (lake, river and bank,** other than sand load), carloads, from Miller and Willow Creek, Ind., to Downers Grove, Ill., via B. & O. R. R., Chicago, C. B. & Q. R. R., rate of 100c per net ton. Present rate, 139c per net ton, intermediate to Aurora, Ill.

18985. To establish on **crushed stone** (in bulk) and **limestone, unburned, agricultural** (in bulk, in open top cars only), carloads, from Kankakee, Lehigh, Van's Siding and West Kankakee, Ill., to points in Indiana and Michigan as shown in Exhibit A.

EXHIBIT A

To B. & O. stations	Prop.	Pres.
Teegarden, Ind.	101	115
La Paz, Ind.	101	115
Lapaz Junction, Ind.	101	115
Bremen, Ind.	101	138
Napanee, Ind.	120	138
Milford Junction, Ind.	120	138
Syracuse, Ind.	120	138
Avilla, Ind.	120	138
Garrett, Ind.	125	Class
St. Joe, Ind.	125	Class
G. T. stations		
Lottaville, Ind.	85	92
Ainsworth, Ind.	85	92
Sedley, Ind.	85	92
Valparaiso, Ind.	85	92
Hasskells, Ind.	85	95
Union Mills, Ind.	90	95
Wellsboro, Ind.	90	95
Kingsbury, Ind.	90	100
Stillwell, Ind.	95	101
Mill Creek, Ind.	95	101
Crumstown, Ind.	95	101
M. C. stations		
Vineland, Mich.	101	113
Hickory Creek, Mich.	101	113
W. A. B. stations		
Pine, Ind.	90	115
Lakeville, Ind.	105	115
Wyatt, Ind.	110	120
Wakarusa, Ind.	110	120

18986. To establish rates on **sand** (except blast, core, engine, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) and **gravel,** carloads (See Note 3), from Irving, N. Y., to Buffalo, N. Y. Proposed rate, 65c; present, 70c.

18988. To establish on **crushed stone,** also **crushed stone screenings,** carloads, usual minimum weight, from Carey, O. (present rates in cents per 100 lb.):

To N. & W. stations, viz.:	Prop.	Pres.
Circleville, O.	105	16
Kingston, O.	115	17

18991. To establish on high grade **sand,** carloads, from origin points located in what are known as the Coalton and Enterprise groups, to Plymouth, Mich. Proposed rate, 189c; present rate, 252c.

18990. To establish on **sand and gravel,** carloads, from Milford, Ind., to points in Michigan on the M. C. R. R., following rates:

Mich. points	Prop.	Mich. points	Prop.
Dailey	92	Buchanan	88
Cassopolis	92	Pokagon	88
Vandalia	107	Dowagiac	92
Jones	107	Glenwood	101
Corey	107	Decatur	101
Fabius	107	Lawton	102
Three Rivers	107	Galien	97
New Buffalo	102	Glendora	97
Three Oaks	102	Baroda	97
Barnett Siding	97	Derby	102
Galien	97	Vineland	102
Dayton	97	St. Joseph	102

Present rates, sixth class.

18993. To establish on **sand and gravel**, carloads, from Breevoorts, Ind., to stations on the Southern Ry., rates as shown below:

To	Prop.	To	Prop.
Mt. Vernon, Ill.	113	Albion, Ill.	108
Marlow, Ill.	113	Browns, Ill.	101
Bluford, Ill.	113	Belmont, Ill.	101
Keenes, Ill.	113	Princeton, Ind.	95
Wayne City, Ill.	113	Francisco, Ind.	95
Sims, Ill.	113	Oakland City, Ind.	95
Boyleston, Ill.	113	Ayrshire, Ind.	104
Fairfield, Ill.	113	Winslow, Ind.	104
Merriam, Ill.	113	Velpen, Ind.	104
Golden Gate, Ill.	108	Duff, Ind.	104
Ellery, Ill.	108	Huntingburg, Ind.	115

Present rates, sixth class.

19030. To establish on **crushed stone**, in bulk, in open cars, and **stone screenings**, in bulk, in open cars, carloads, from Lynn, Ind., to Snow Hill, Ind., via Penn. R. R., rate of 60c per net ton. Present rate, $1.05 (rate from Kokomo, Ind.).

19031. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) and **gravel**, carloads, from South Lebanon, O., to Cincinnati, O., rate of 40c per net ton. Present rate, 90c (rate from Columbus, O.).

19037. To amend C. F. A. T. B. Tariff 197K, I. C. C. 2079, naming commodity rates on **crushed stone**, etc., from Thornton, Ill., to various points in C. F. A. territory, in the following manner:

To stations on the Michigan Central R. R.

Add the C. & E. I. in Note 1, page 8.

Add the C. & E. I. as one of the roads participating in rates prefixed with character circle reference mark 51 opposite stations Index Nos. 2755 to 2890.

To stations on the Pennsylvania R. R.

Add the C. & E. I. in Note 1, page 8.

Add the C. & E. I. as one of the roads participating in rates prefixed with character circle reference mark 51 opposite stations Index Nos. 3975 to 4030, inclusive, and Nos. 4216 to 4300, inclusive, and as one of the roads participating in rates prefixed with character circle reference mark 95 opposite stations Index Nos. 3915, 3920, 4050 to 4065, inclusive.

To stations on the Pere Marquette Ry.

Add the C. & E. I. in Note 1, page 8.

Add the C. & E. I. as one of the roads participating in rates prefixed with character circle reference mark 51 opposite stations Index Nos. 4590 to 4606, inclusive, 4610 to 4696, inclusive, 4700 to 4760, inclusive, and 4784 to 4796, inclusive.

19039. To establish on **sand and gravel**, carloads, from Burr Oak, Ind., to Chesterton, Ind., rates of 95c per net ton. Route via N. Y. C. & St. L., La Porte, Ind., N. Y. C. Present rate, sixth class.

19040. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) and **gravel**, carloads, from Wolcottville, Ind., to Millersburg, Mishawaka and South Bend, Ind., rates as shown below. Present and proposed rates (in cents per net ton):

To	Prop.	Pres.
Millersburg, Ind.	80	82
Mishawaka, Ind.	95	101
South Bend, Ind.	95	101

Route via Penn. R. R., Kendallville, Ind., N.Y.C.

19041. To establish on **crushed stone, crushed stone screenings**, in bulk, **limestone, agricultural** (not ground or pulverized, in bulk in open top cars only), and **agricultural limestone screenings**, carloads (See Note 3), from Sandusky, O., to Austintown and Mineral Ridge, O., rate of 115c per net ton. Route via N.Y.C.-Erie. Present rate, class.

19052. To establish on **crushed stone**, carloads, from Gibsonburg, O., to Millersville, O., via Penn. R. R., rate of 50c per net ton. Present rate, 60c per net ton.

19053. To establish on **refuse foundry sand**, carloads, minimum weight 50,000 lb., from Berea, O., to Linndale, O., commodity rate of 60c per net ton. Present rate, sixth class, 8½c.

19055. To establish on **sand**, carloads, viz., **blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding and silica** (See Note 3), except as otherwise provided, from Coalton, Ohio, Group to Manistee, Mich. Rate of 382c per ton of 2000 lb. Present rate, 550c per ton of 2000 lb.

19057. To establish on **crushed stone**, carloads (See Note 3), from McVittys, Ohio, to Thrifton, Fruitdale and Waverly, Ohio, following rates (in cents per net ton):

To—	Present	Proposed
Thrifton, Ohio	115	100
Fruitdale, Ohio	115	110
Waverly, Ohio	135	110

Route—Via Springfield, Ohio, and the D. T. & I. R. R.

TRUNK LINE ASSOCIATION DOCKET

19251. **Crushed stone**, carloads (See Note 2), from Pompton Lakes and Ogdensburg, N. J., to Stroudsburg, Penn., $1.05 per ton of 2000 lb. Reason—Proposed rates are comparable with rates on like commodities from and to points in same general territory.

19255. **Crushed stone**, carloads (See Note 2), from Ormrod, Penn., to Penn Haven, Junction, Weatherly, Ashmore, Hazle Brook, Foundryville, Ebervale, Harleigh Colliery and Milnesville, Penn., $1 per ton of 2000 lb. Reason—Proposed rates are comparable with rates now in force to Pattenburg, Nesquehoning, Penn., etc.

19258. **Agricultural lime**, carloads, minimum weight 30,000 lb., from Spahr, Md., to stations on B. & O. R. R., Viaduct, Md., to Garrett Park, Md., 10½c; Halpine to Rockville, Md., 9½c; Derwood to Gaithersburg, Md., 9c; Brown to Boyds, Md., 8½c; Buck Lodge to Dickerson, Md., 8c; Tuscarora, 7½c; Lime Kiln to Buckeystown, Md., 7½c; Adamstown Pkg. Co. to Brunswick, Md., *7½ per 100 lb. *Present local rate from Frederick is 5c per cwt., but propose to increase same to 6c in order to eliminate fourth section violation. Reason—Proposed rates are comparable with rates from Spahr, Md., to Frederick Junction to Baltimore, Md., inclusive.

19266. **Sand**, other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads (See Note 2), from Morrisville, Penn., to Delair and Fish House, N. J., 75c per ton of 2000 lb. Reason—Proposed rates are comparable with rates on like commodities from and to points in the same general territory.

19267. **Crushed stone**, carloads (See Note 2), from Morrisville and Tullytown, Penn., to Middletown, N. J., 90c per ton of 2000 lb. Reason—Proposed rates are comparable with rates now in force to Deal, Bradley Beach, Avon and Spring Lake, N. J.

19272. **Crushed stone**, carloads (See Note 2), from Campbell, Penn., to Newport, Penn., $1.10; Thompsontown and Mexico, Penn., $1.25 per ton of 2000 lb. Reason—Proposed rates are comparable with rates on like commodities from and to points in the same general territory.

19275. **Sand** (other than blast, engine, foundry, glass, molding or silica) **and gravel**, carloads (See Note 2), from Wyoanna Falls and La Grange, Penn., to Marcy to Springville, Penn., incl., 75c per ton of 2000 lb. Reason—Proposed rates are comparable with rates on like commodities from and to points in the same general territory.

19301. A, **Sand**, other than blast, engine, filter, foundry, glass, molding, quartz, silex or silica, **and gravel**, N. O. I. B. N. in O. C. B, **Sand, blast, engine, filter, foundry, blast, molding, quartz, silex or silica and molding gravel**, from sand shipping points in southern New Jersey on the Reading Co. to stations on the P. R. R., also from sand shipping points in southern New Jersey on the P. R. R. to destinations on the Reading Co., also from Lews, Del., to points on the Reading Co. Statement of rates will be furnished upon request.

19189. **Stone, ganister**, carloads (See Note e2), from Petersburg to Covedale, Penn., Williamsburg to Ganister, Penn., Point View to Tyrone Brick and Tile Co., Penn., Tipton to Altoona, Penn., Duncansville to Brookes Mills, Penn., and Port Matilda, Penn.; to Warren, Ohio, New Castle, West Middlesex, Wheatland, Farrell, Sharon, Sharpsville, Shenango and Greenville, Penn., $1.90 per ton of 2000 lb. Reason—Proposed rates are in accordance with decision I. C. C. Docket 18089.

19193. (A) **Building sand**, carloads, (B) **sand, blast, engine, molding, glass, silica, quartz or silex**, carloads (See Note 2), from Mapleton District, Penn., to Williamsport, Penn., (A) $1.50 and (B) $1.65 per ton of 2000 lb. Reason—Proposed rates are comparable with rates on like commodities for like distances, services and conditions.

19195. **Sand**, other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads (See Note 2), from Morrisville and Tullytown, Penn., to Swedeland, Penn., 90c per ton of 2000 lb. Reason—Proposed rates are comparable with rates on like commodities to Shawmont, Merion and Ardmore, Penn., etc.

19069. **Stone, crushed**, carloads (See Note 2), from Cedar Hollow and Swedeland, Penn.:

To	Prop.	To	Prop.
Carpenter, Del.	115	Kiamensi, Del.	115
Wooddale, Del.	115	Leslie, Md.	150
Landenberg, Penn.	125		

Rates in cents per 2000 lb.

19222. **Stone, natural** (other than bituminous asphalt rock), **crushed**, N. O. I. B. N., carloads (See Note 2); also, **unburned ground limestone**, carloads, minimum weight 50,000 lb., from Jordanville, N. Y., to Floodwood, Saranac Inn, Lake Clear Junction, N. Y., $1.60, and Saranac Lake, Gabriels, Rainbow Lake, Onchiota, Lake Kushaqua, Morgan, Loon Lake, Plumadore, Bryants Siding, Mountain View, Owl's Head, Chasm Falls, Whippleville and Malone, N. Y., $1.90 per ton of 2000 lb. Reason—Proposed rates are comparable with rates on like commodities for like distances, services and conditions.

19237. **Stone, crushed** (other than bituminous asphalt rock), carloads (See Note 2), from Northampton, Penn., to Mauch Chunk, Penn., 75c per ton of 2000 lb. Reason—Proposed rates are comparable with rate now in force from Bethlehem to Mauch Chunk, Penn.

SOUTHERN FREIGHT ASSOCIATION DOCKET

41009. **Sand and gravel**, from Petersburg, Ellerslie and Warmore, Va., to Antlers, Va. It is proposed to reduce the rates on sand and gravel (See Note 3), from and to points mentioned above, to be 115c per net ton.

41087. **Sand and gravel**, from Owensboro, Ky., to T. C. Ry. stations. Combination now applies. Proposed rate on **sand and gravel**, in packages or in bulk, carloads (See Note 1), except that in the absence of weighing facilities at shipping point, if freight is weighed in transit or at destination, carloads, minimum weight, will be 90% of stencilled capacity of car, and except further, where cars are loaded to their visible capacity, in which case actual weight will govern, from Owensboro, Ky: To Carthage Junction, Lancaster and Buffalo Valley, Tenn., 181c; Silver Point, Flippens, Boma, Baxter, Bloomington, Double Springs and Cookeville, Tenn., 193c, and to Gordonsville and Carthage, Tenn., 181c per net ton, same as rates now available from Paducah, Ky., on basis of combination.

41109. **Lime, fluxing**, from Erin, Hematite, Lime Work, Palmyra and Rauscher, Tenn., to Middletown, Ohio. Combination now applies. Proposed rate on **lime, fluxing**, having no commercial value for chemical or building purposes, carloads, minimum weight 60,000 lb., from the origins above mentioned, to Middletown, Ohio, 386c per net ton. Same as rate from Knoxville, Tenn., and reflects the usual basis for making rates on this commodity to Middletown, Ohio.

41134. **Sand, gravel, stone**, etc., between points on the L. H. & St. L. Ry. and points in southern territory. It is proposed to add the L. H. & St. L. Ry. as a participating carrier in Agent Glenn's I. C. C. A655, naming joint, local and proportional rates on sand, gravel, slag, stone and chert, carloads, between points on the L. H. & St. L. Ry. points in southern territory.

I. C. C. Decisions

18208. Cement Rates. Rates on cement, carloads, from Ada, Okla., unreasonable to some destinations and not unreasonable to other destinations in Texas, Louisiana and Arkansas. Rates to the following points were unreasonable and reparation allowed:

To Honey Grove, Tex., 17 cents; to Sulphur Springs, Tex., 18 cents; to Clarksville, Winnsboro, Pittsburg, and Ennis, Tex., 19 cents; to Corsicana, Richland, Navarro, Wortham, and Maria, Tex., 19.5 cents; to Marshall, Tex., 20 cents; to Gilliam, La., 23.5 cents; and to Zwolle, De Ridder and De Quincey, La., and Beaumont, Tex., 25.5 cents. The commission further found that the rate on cement, in carloads, in effect prior to November 10, 1924, and during the statutory period, from Ada to Alma, Mulberry, Altus, Clarksville, Morrilton, Palarm, and Morgans Spur, Ark., were unreasonable to the extent they exceeded 21.5 cents. Commission also found that the present rates on cement in carloads from Ada to the destinations in Arkansas named in the complaint have not been unreasonable since November 10, 1924, and that the rates from Ada to all other destinations named in the complaint were not unreasonable.

18566. Glass Sand. Rates on glass sand from Berkeley Springs, Great Caeapon, and Hancock, W. Va., to Millville, N. J., unreasonable to the extent that it exceeded, exceeds or may exceed $2.80 per net ton. Reparation awarded.

Gravel Deposits Found by Former Lessee Are Not Deductible on Discovery Basis

Commissioner of Internal Revenue Upheld in Refusing to Permit Depletion Deductions on Tax Return

EVANGELINE GRAVEL CO., INC., v. COMMISSIONER OF INTERNAL REVENUE. DOCKET NO. 12806. BOARD OF TAX APPEALS.

THIS was a proceeding for redetermination of a deficiency assessed by the Commissioner of Internal Revenue after disallowing claimed deductions on the basis of discovery value of certain gravel deposits. It was shown that a corporation took over a lease of gravel bearing land from an original lessee who had discovered the gravel by test borings. Upon these facts, the Board of Tax Appeals ruled that the corporation was not entitled to depletion deductions.

Following is the full text of the findings of fact and the opinion:

The petitioner is a corporation, and during the year 1921 was engaged in the business of extracting sand and gravel at Alexandria, La.

The petitioner was incorporated October 16, 1919, and acquired from one G. K. Force, lessee, a lease and option to purchase an 80-acre tract of land containing gravel deposit. Prior thereto, Force had sunk six test wells for the purpose of ascertaining the quality and quantity of gravel. This was necessary because no gravel showed on the surface and a surface examination of the land would not determine the gravel content. Various other leases were made by others, and later taken over by the petitioner; but none were worked except the first—the 80-acre tract.

Petitioner Paid Royalty on Removals

In February, 1920, the petitioner exercised its option and purchased the 80 acres for the sum of $24,351.90. The petitioner had to pay Force and four other original lessees a royalty of 5 cents per ton for all sand and gravel removed from the land so acquired.

The gravel content of the 80-acre tract, at the beginning of operations, was estimated by an experienced man to be 1,000,000 tons. This proved to be approximately correct.

In order to work the dredges, it was found necessary to build a wooden dam in 1920. By 1921 this dam was no longer needed and was removed by pumping toward it, thus undermining it and washing it away. The plant and equipment of the petitioner were of new materials, except the rails and locomotives. There was a power plant, railway and its equipment, two dredges, a washing plant, and a gravel plant. During the year 1921 the petitioner operated one dredge 24 hours per day.

No depreciation was taken by the petitioner with reference to the dam, but in 1921 the original cost was charged off as a loss. The respondent now concedes this to be a proper deduction.

In its tax return for the year 1921 the petitioner claimed a deduction for depreciation with respect to its dredge, gravel plant, power plant and equipment, railway and railway equipment, computed at the rate of 20%. The respondent allowed a deduction computed at the rate of 10%. The petitioner based its 20% deduction upon an estimated removal of all the gravel in five years' time. The plant was still in use in February, 1928. There is no evidence as to its salvage value.

The petitioner also claimed deduction for depletion based on discovery value under Section 214 (a) (10) of the Revenue Act of 1921. This deduction, also based upon an estimated five-year economic life of the gravel deposit, was computed at $0.2089 per ton on 99,116.31 tons, which was the tonnage removed in 1921. The respondent allowed a depletion deduction at the rate of $0.024 per ton on 104,031.59 tons, which was the tonnage removed during 1920 and 1921. This was based upon the engineer's report.

Opinion by Marquette: Two questions are to be determined in this proceeding, viz.: (1) The proper rate of depreciation to be allowed for the year 1921 with respect to five items of the petitioner's assets, and (2) the proper rate of depletion deduction to be allowed for exhaustion of a gravel deposit for the same year.

The pleadings indicate a third question relating to the total loss of the useful life of a dam; but this is now conceded by the respondent in his brief.

The sections of the 1921 Revenue Act which are applicable here provide:

> Section 234. (a) That in computing the net income of a corporation subject to the tax imposed by Section 230, there shall be allowed as deductions:
>
> * * *
>
> (7) A reasonable allowance for the exhaustion, wear and tear of property used in the trade or business, including a reasonable allowance for obsolescence. In the case of such property acquired before March 1, 1913, this deduction shall be computed on the basis of its fair market price or value as of March 1, 1913.
>
> * * *
>
> (9) In the case of mines, oil and gas wells, other natural deposits, and timber, a reasonable allowance for depletion and for depreciation of improvements, according to the peculiar conditions in each case, based upon cost, including cost of development not otherwise deducted; Provided: That in the case of such properties acquired prior to March 1, 1913, the fair market value of the property (or the taxpayer's interest therein) on that date shall be taken in lieu of cost up to that date; Provided further, That in the case of mines, oil and gas wells, discovered by the taxpayers, on or after March 1, 1913, and not acquired as the result of purchase of a proven tract or lease, where the fair market value of the property is materially disproportionate to the cost, the depletion allowance shall be based upon the fair market value of the property at the date of the discovery, or within 30 days thereafter: * * *

Petitioner Cites Case on Depreciation

With respect to depreciation, the petitioner relies upon Colconda Oil Co., 7 B. T. A. 955, wherein it was held that oil well equipment, which would have no useful life or value after the oil was all extracted, should be depreciated at the same rate as that at which the oil was depleted within the taxable year. That, however, does not fully cover the present situation; for we have no proof before us that the petitioner's dredges, railway and equipment, and the like, would have no useful life after the gravel pit had been exhausted. It is true the petitioner was operating only upon one tract of the several which it had; it may also be true that the petitioner would abandon the gravel business upon the exhaustion of this one pit. But so far as the evidence shows, the machinery and equipment was usable and in good condition even after more than seven years' usage and we cannot agree with the petitioner that under the circumstances of this case the rate of depreciation should be based solely upon the so-called unit of production basis. As was indicated in the Golconda case, supra, there is no one fixed and universal rule to be followed; but the facts in each case must be carefully considered, together with the surrounding circumstances; and then, in the light of such facts and surroundings, a deduction made which shall constitute a reasonable allowance.

In the case of United States v. Ludey, 274 U. S. 295, it is said that:

> "The amount of the allowance for depreciation is the sum which should be set aside for the taxable year in order that, at the end of the useful life of the plant in the business, the aggregate of the sums set aside will (with the salvage value) suffice to provide an amount equal to the original cost."

The respondent, in his deficiency notice, placed the proper rate of depreciation at 10%; in his answer filed in this proceeding he claims that 6⅔% is correct. In other words, that the useful life of the property in question was 15 years. He has offered no evidence to support this claim, and, in our opinion, it is not substantiated. On the other hand, the petitioner has not offered any proof as to the salvage value of the plant. We think that a reasonable allowance for depreciation is that based upon a 10-year useful life, and, therefore, we sustain the respondent's original determination upon this point.

As to depletion, the facts clearly show that the petitioner is not entitled to a deduction based upon discovery value, even though gravel deposits are within the statute. In the first place, as to discoveries after March 1, 1913, the discovery must be made by the taxpayer; secondly, the property must not be acquired by purchase of a proven tract or lease. The petitioner's status, as to both these provisions, is directly contrary to them.

The statute further provides that depletion based on discovery "shall be based upon the fair market value of the property at the date of discovery or within 30 days thereafter." The petitioner has not proven such value.

A reasonable allowance for depletion is proper, however, under the statute. The burden being upon the petitioner to show the respondent to be in error in his determination of the amount of allowance depletion, and that burden not having been sustained by any evidence, we must conclude that the respondent's allowance was correct.

The petitioner's tax for the year 1921 should be recomputed, allowing it a deduction in full for the value of the dam destroyed in 1921, and computing depreciation and depletion at the respective rates fixed by the respondent in his deficiency notice.

Portland, Ore., Gravel Producers End Price Controversy

APPARENTLY a satisfactory settlement has been reached in a sand and gravel controversy in Portland, Ore., which for a time threatened to reach the proportions of a real "war." The *Daily Oregonian* states:

"Prices on sand and gravel have risen here the last day or two to a generally quoted rate of $1 per cu. yd. on the docks. The war between producing companies seems ended, at least for a while.

"While this is an increase of as much, in some instances, as 40%, yet sand and gravel men say the new price barely meets cost of production in most instances and does not quite equal it in others. Some hinted that even further increases are possible, perhaps as early as the middle of next week. The market has been so disorganized the last year or two, it was pointed out, that there is no real base on which to estimate a percentage of increase in the new price.

"One prominent sand and gravel company has been asking 70 cents a yard on the dock until July 5, when the price went to $1. Another large concern was asking 60 cents a yard up to the same time when they, too, raised to $1. A third concern said they have had no regular price. 'We've been asking what we thought we could get—bickering on almost every order—in an effort to get as much as we could to meet expenses,' the company spokesman declared.

"The company that has been selling at 70 cents a yard up to July 5, declared it cost 98 cents a yard to put the material on the dock. The concern that sold at 60 cents said its production costs were a fraction of a cent in excess of $1 a yard. Statements from various firms indicated that production costs varied with each company, depending upon individual conditions.

"'But we've reached a general understanding among ourselves,' said one sand and gravel dealer yesterday, 'to at least sell for the cost of production instead of fighting.'

"Result of the increased prices, it seemed yesterday, would be felt most by the small contractor and house builder, who do not take great amounts of material for any one job. By this time of year the paving contractors and those engaged on public works or big buildings have definitely lined up their supplies of sand and gravel and will pay, even on materials delivered later this season, the lower prices agreed upon before the increase went into effect."

American Aggregates Corp. Buys Three Cincinnati Operations

CONTROLLING INTERESTS in three of the largest producers and distributors of sand and gravel in Cincinnati passed into the hands of the American Aggregates Corp., Greenville, Ohio, through a deal which was closed July 18.

The American Aggregates Corp., said to be the largest producers of sand and gravel in the United States, with headquarters at Greenville, Ohio, has gained control of the Ohio Gravel Ballast Co., the Red Bank Gravel Co., and the Cincinnati Sand and Gravel Co.

Purchase of the controlling interest in the three Cincinnati companies by the Greenville corporation is said to have been prompted by the big building development in Cincinnati and its desire to enter the local field. This connection gives it the prestige of being the biggest distributor of sand and gravel in the Middle West.

The three Cincinnati companies control approximately 800 acres of land with valuable gravel deposits. The Ohio Gravel Ballast Co., the largest of the three companies involved in the deal, has three producing plants on rails and is the largest producer of gravel in northern Kentucky and southwestern Ohio. The officers of this are: Earl Zimmerman, president; Fred Cornuelle, vice-president and general manager; Albert H. Morrill, secretary, and George W. Doran, treasurer.

Controlling interest in the Red Bank Gravel Co. was held by Fred Cornuelle, who also is president of that company. The Cincinnati Sand and Gravel Co. recently was incorporated by a group headed by William Reehl, realtor. Harry Donnelly is the active head of the company.

For the present the Cincinnati companies will retain their individual identities and the plants and will continue under the management of the present officials. The combined plants are said to have assets of approximately $3,000,000.

The plants of the American Aggregates Corp. are located at strategic points with reference to transportation and markets in Ohio, Indiana and Michigan, having been developed through successful operation covering more than a quarter of a century. The company, according to its balance sheet as of December 31, 1927, had total assets of $6,366,365.—*Cincinnati* (Ohio) *Times-Star.*

Portland, Ore., Sand and Gravel Producers Organize Sales Company

TERMS of an agreement under which the output of the large sand and gravel producers of this district will be handled by a single sales agency have been agreed to by executives of the concerns affected and will become operative soon. Prices of sand and gravel will be increased for the second time within three weeks, this time from the prevailing price of $1 a cu. yd. to a price understood to be $1.25 a cu. yd.

When this agreement is put into effect the sand and gravel war which started nearly two years ago with the entrance into the field of the Ross Island Sand and Gravel Co. and which has raged more or less intermittently since will be brought definitely to a close.

This action was forecast two weeks ago when the quoted price was set ahead by the producers nearly 40%. The market has been so disorganized and the prices so low, the operators claim, that all of them have suffered heavy losses. Contractors, too, were disturbed by the chaotic price situation, since they did not know what costs to allow in their bids. They have agreed that the new price schedule is a reasonable one, it was said.

The agreement provides that the stock of the selling agency will be owned by the operators who are party to the agreement and that the agency will handle the retailing of the output of these operators in Multnomah county. Contracts with each producer will be signed, binding the concern to this provision. It means, in the words of one producer, that the gravel companies will go out of the retail business and do only wholesaling. This will eliminate duplicate sales agencies and duplicate delivery services.

All of the present producing companies are to continue to operate, supplying sand and gravel to the selling agency as required. Outside of Multnomah county the companies will be allowed to continue their retail trade as in the past.—*Portland* (Ore.) *Oregonian.*

Addendum

AN article in the June 9 issue of ROCK PRODUCTS, page 87, in the "Hints and Helps for Superintendents" department described how "A Moveable Plant Helps on Special Orders" for sand and gravel. The plant described was one of those operated by the Fort Worth Sand and Gravel Co., Fort Worth, Texas. The plant was unusual, but of a type that is finding quite a wide application in the Southwest; therefore, the exact details as to its equipment are of more than ordinary interest. The screen used in this moveable plant, we are informed, is a Leahy "no blind" vibrating screen, made by the Deister Concentrator Co., Fort Wayne, Ind.

A West Coast Roofing Granule Producer

A RECENT quarterly report on "Mining in California" by the state division of mines and mining contains the following data on new roofing granule producer:

"Jasper Rock Quarries. (Formerly Merced Stone Quarries.) This property consists of 60 acres of patented land, situated on the north side of Merced River on Yosemite Valley Railroad, at Jasper station in Sec. 19, T. 3 S., R. 16 E. Elevation, 800 feet. A crushing plant was at one time operated here by E. B. and A. L. Stone Co. of San Francisco, and the rock sold as ordinary ballast. In 1927 the quarry was acquired by H. J. Kelm of Bagby, who recognized the value of the rock for special use in the building industry in the manufacture of composition roofing and shingles, and as surfacing granules. He reopened the quarry under the name of Jasper Rock Quarries, and is now producing variously colored jasper rock for special uses at the rate of 40 tons per day. Address, Jasper Rock Quarries, H. J. Kelm, owner, Bagby, Calif.

"The deposite consists of highly silicified sedimentary formations. They dip about 45 deg. W. and have been opened up across the face for 900 ft. In the eastern end of the quarry the jasper is green in color, but toward the western end, red, brown, purple, green and variegated colors occur. Strata heavily impregnated with manganese occur in the footwall and some chimneys of manganese are found. At present the output is shipped as quarry run, all crushing being done at the manufacturing plants. The quarry is worked by open cut, the face standing 120 to 150 ft. in height. Equipment includes one 20-hp. and one 7-hp. gas engine for operating, compressor and hoist; air drills, 1000 ft. of track, mine cars and boarding house. Ten men are employed."

Pine Bluff, Ark., to Have New Gravel Plant

ANNOUNCEMENT of the formation of the Reliance Sand and Gravel Co., of Pine Bluff, Ark., was made recently by A. D. Foster and associates, who have been operating gravel beds owned by the new concern for the past several weeks.

The firm owns a big glacial gravel mound and deposit on the Sheridan road, eight miles from Pine Bluff. This gravel has been approved by the state highway department, Mr. Foster stated.

The company has already made several sales, Mr. Foster said, and will deliver gravel in increasingly large quantities. Machinery has been purchased and a crew of men is at work there.

Mr. Foster for years has been prominent in banking and business circles in Arkansas. Associated with him are several Pine Bluff men.—*Pine Bluff* (Ark.) *Graphic.*

Silica Deposit at Ottawa, Illinois, Sells for $526 Per Acre

A DEED for the transfer of a 76-acre tract of sand land, which will be used for the construction of the first unit of the plant of the Ottawa Sands, Inc., was filed with Arthur E. Young, the county recorder, in Ottawa. The land was obtained by the new sand company for $40,000, which was $526 per acre. The plant of the Ottawa Sands, Inc., a new $500,000 crude sand producer, is to be constructed and in operation by September 1.

The land transferred lies west of Moriarity Hill viaduct and north of the Rock Island railroad. The new sand company is being organized by a group of Chicago men, several of whom have been interested in Ottawa sand concerns before. The incorporators of the company are Hiram A. Cooley, Arthur B. Hewson and John A. Balko. Mr. Cooley, who was instrumental in the organization of the Ottawa Silica Molding Sand Co., is to be in charge of construction and operations and Mr. Hewson, who was formerly vice-president of the Ottawa Silica Molding Sand Co., will be in charge of the Chicago office of the company, and of sales.—*LaSalle* (Ill.) *Post.*

Oyster-Shell Lime Plant for Houston, Texas

PLANS and specifications are being prepared by Arnold and Weigel, engineers, of Woodville, Ohio, for the construction of a $350,000 oyster-shell lime plant to be built for the W. D. Haden interests on their Greens bayou property, one mile north of the Ship Channel, Houston, Texas, according to announcement by Cecil Haden recently.

The plant will be the first of its kind for Houston and represents a departure in lime manufacture methods. Oyster-shell lime has been made heretofore on a rather small scale and by crude methods.

The new Haden lime plant will be of the rotary kiln type and will have a capacity of 60 to 75 tons per day, Mr. Haden pointed out.

The new Houston industry, located in the Ship Channel industrial district, will be located on a site recently purchased for the purpose and having 1700 ft. frontage on Greens bayou. It is 1500 ft. south of the Market street road, which is a paved thoroughfare into the city.

Preliminary construction of the plant has been started, pending completion of plans and specifications. The Missouri Pacific lines are laying adequate trackage from the belt line designed to serve future channel industries in the neighborhood of the proposed terminal system, and has the Haden trackage under way.

The plant will be placed in operation during the spring of next year, Mr. Haden stated. It will be supplied with natural gas fuel by the Dixie Gulf Gas Co.

In connection with the lime plant will be an oyster shell crushing plant for the manufacture of crushed oyster shell for poultry and oyster shell meal for liming of soils, as well as use in the mixed feed industry.

The Haden plant will be a one-story factory type building of steel and corrugated asbestos construction.

The lime made from oyster shells is of the purest variety, according to Mr. Haden, and is not only an excellent building lime but also is well adapted for use in the chemical industries where a pure high calcium lime is demanded.—*Houston* (Tex.) *Post-Dispatch.*

Contract Awarded for Feldspar Mill in North Carolina

LETTING of the contract for the erection of the 100-ton daily capacity feldspar grinding plant in Yancey county, near Bowditch, by the North Carolina Feldspar Co. brings another important development in an industry in which the state already stands at the top.

The North Carolina Feldspar Co., capitalized at $500,000, is a concern backed by state and outside capital, and has as its president J. F. Shin, of Norwood, N. C.

Word has also been received by state geologist H. J. Bryson, who was instrumental in bringing about the development, that machinery for the plant has already been ordered. It is expected that the mill will be in operation before the end of the current year.

With the added daily capacity of 100 tons for the proposed plant the total capacity of the mills in North Carolina will be brought to 430 tons daily. The projected plant will be the fourth in the state and will be so constructed that additional units may be added later.—*Conservation and Industry,* Raleigh, N. C.

Piedmont Corporation To Build New Georgia Granite-Crushing Plant

LOCAL newspapers in Georgia contain details of a project by the Piedmont Corp., New York City, to build railway spur from Lithonia to Rock Chapel Mountain in De Kalb county, near Decatur, for the purpose of developing extensive quarry operations for the production of crushed stone.

Expenditure of about $400,000 is said to be contemplated in the erection of a crushing plant of about 40 cars daily capacity, and an asphalt-mixing plant. Contracts for the construction of the railroad and accessories has been let to the Macdonald Construction Co., New York City.

The railroad will be four miles in length. It will replace a railroad that was torn up soon after quarrying operations were shut down at Rock Chapel mountain during the world war. These operations had been carried on about 10 years prior to the war, and since that time nothing has been done on a large scale.

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Northwest Concrete Products Association Meets at Rainier Park

Products Men Hold Third Midsummer Meeting at Paradise Inn on July 16 and 17

THE third midsummer meeting of the Northwest Concrete Products Association was held in an ideal setting veritably on the top o' the world at Paradise Inn in Rainier National Park, and brought together an increasing number of Pacific Northwest manufacturers and specialists in concrete.

The outstanding address given during the two-day convention was made by W. D. M. Allan, manager of the Cement Products Bureau, Portland Cement Association, Chicago, Ill., who covered his subject, "Merchandising of Concrete Products" in a most acceptable manner and gave his hearers many practical ideas for the upbuilding of their business. He declared there is now a gross overcapacity of concrete materials and finished products in many plants, at least 50% more than can be sold at present, and he urged that manufacturers use every effort to create a greater demand for their products. He declared they should look forward to keen competition, and that it would be to their advantage to try and get from 4 to 5 cents for home building materials where only 3 cents is being spent at the present time.

In a discussion, illustrated with graphs and charts, Mr. Allan described the history of the revision of a number of concretee plants, particularly those in eastern and middle western states. "Keep your plants small and work the life out of it," he urged. "The small plants utilizing multiple shift operations are money makers. Be chary of expansion lest your machinery rust out instead of wear out. More plants depreciate through obsolescence than through production. Have fewer machines and keep them busy."

The speaker also discussed the development of merchandising from the time the buyer sought goods to the time sales organizations were developed, and on to the formation of an association of associations to teach and assist in merchandising the completed product.

W. D. M. Allan Discusses Problems of the Industry

Some 18 problems of the industry were shown on an enlarged chart and thoroughly discussed by Mr. Allan, as follows: Development of sales organizations; Increase in the volume of advertising; Increase in plant operation and output; Creation of new business; Improvement of service; Improvement in insurance rates; Improvement in freight rates; Use of materials economically; Reduction of overhead; Making use of technical data; Development of new uses for products; Elimination of piker products; Education of brick masons; Development of public confidence; Elimination of knocking; Development of pride in the industry; Expansion of building codes; Development of trade associations.

In closing his address Mr. Allan outlined the results of a number of mergers and urged his hearers to consolidate with caution. Companies must not overlook the good will of a concern but yet must watch plant equipment of plants concerned and never consolidate with a weak company. He believed that in advertising an aggressive salesman who made many more calls per day than his competitor would secure the most business, and that this method was preferred over either direct mail advertising or other forms. Sales organizations above par should be maintained, Mr. Allan concluded.

In an address to the convention on "Life's Mixture," the Rev. C. Oscar Johnson of the First Baptist Church of Tacoma spoke of the combination made up of men, money and morals, and compared life with the manufacture of concrete products, pointing out that while men and money were essential in the "mix," it availed nothing if morals were left out and he charged his hearers that they should shoulder the responsibility entrusted to them in their sons and daughters who were to carry on the concrete work of the future.

Professor S. H. Graf of the Oregon State College gave the manufacturers the results secured from testing 87 specimens of drain tile, and in a paper on "Results Compared with Service and Specification Requirements," advising that thus far no reliable data in this respect was available for manufacturers. In his interesting paper he gave data secured on three kinds of tile, namely, farm, standard and extra quality. From the results of his tests on samples submitted by five companies that are now manufacturing drain tile in Oregon he found that these companies are all turning out quality products. Samples were shown the delegates of drain tile that had been impregnated with tar and also sulphur and tar, and he stated that the strength of these had been greatly increased.

D. W. King, assistant city engineer of Tacoma, substituting for City Engineer Putnam, said: "To show what the city of Tacoma thinks of concrete sewer pipe after several years of experience we are going to lay in excess of thirty-one miles for our main trunk system, ranging in size up to 84 in. in diameter, and in our local sewers as many miles more of pipe of smaller diameter."

He called attention to some poor quality of pipe that had been manufactured and laid in the past due to poor manufacturing methods and lax inspection on the part of city officials, but declared that he was sure these mistakes would not be repeated on either side again and urged that all manufacturers should strive for perfection, always using a high quality of aggregates with sufficient cement to be sure that there would then be no regrets

in the future on either side.

G. W. Gleason, Engineering Experiment Station Fellow, Oregon State Agricultural College, gave his second progress report on disintegration of concrete. His paper was instructive and showed results of deep study and effort. He touched on the disintegration of concrete caused by solution of Douglas fir bark and also the fir needle, which carried high content of tannic acid. He urged his hearers to make a product that would be as nearly impervious as possible. He thanked the members who had submitted samples of their products which had helped him in his experiments and promised that his investigations would be continued and that the results obtained would be passed on to the manufacturers.

Bailey Tremper, testing engineer of the State Highway Department of Washington, spoke on "Results of Tests on Culvert Pipe," advising that from his tests he had determined that products in this state were generally uniform, but that manufacturers should ever be on the lookout for weak links. "Poor manufacturing," he stated, "brings values down and the dealer must find out the reason for failure and immediately correct them." In addition he gave interesting data on absorption and durability tests. He urged read a report of recent investigations on frequent screen tests, recommending that they be made daily if possible. His discussion of bone dry tests versus moderately dry tests led to a general discussion between Mr. Tremper and a number of the members. He reported that he had also found a splendid spirit of co-operation on the part of manufacturers in making tests.

Investigation of Concrete Pipe

R. P. Rogers, junior in civil engineering at the University of Washington, the relationship between concrete cylinders and concrete pipe, which had been prepared by himself and W. T. Wright, senior in civil engineering at the University. During the past six months about seventy samples had been tested in an endeavor to find the most economical mixes. Samples of both cylinders and concrete pipe were tested and given a high rating. He stated that it was the decision of himself and colleagues to carry on and establish definite relationships between the products.

A number of the members held evening sessions of the various committees and made their reports at the meetings held the second day. Mr. Zaugg, chairman of concrete blocks committee, asked that the various members engaged in block business send him their costs, so that a consolidated report could be handed to the National Association for its consideration. The culvert committee were unable to decide on specifications for reinforcing and for compression and therefore it was decided that the committee will continue to function, to clear up the matter.

President W. H. Sharp was given an ovation by the members when he advised that the finances of the association had been materially strengthened and that a considerable portion of the surplus would be used in advertising of concrete products during the balance of the year.

Howard Hall of Eugene, Ore., invited the association to hold their fourth annual meeting in the university city next January, and this was immediately put in motion and unanimously passed. It was also voted that an invitation be forwarded to the National Concrete Association to hold their next annual convention somewhere in the Northwest. Executive Secretary "Phil" Zaugg moved that a vote of thanks be extended to various member concerns who helped in many ways to make the convention a success, and also to all the trade magazines who gave the association valuable space and assistance at this and previous conventions.

Another interesting and instructive address was given by W. D. M. Allan at the final day's session on the "Fundamentals

Members and guests of the Northwest Concrete Products Association at the July meeting on Mt. Rainier

of Good Concrete." He stressed the point in this discourse that manufacturers generally neglected to take into account fine materials, and urged them to become familiar with the data sheets as issued by the Portland Cement Association. He also called attention to the proper mixing and stated that it was his opinion that increasing the time of mixes increased the strength of the products. Also that increased tamping would prove beneficial and make the concrete much denser and give better results. The problem of cracking was next dwelt on at considerable length, and it was admitted that more data was needed on this phase of the business and that it would be most welcome. In extremely hot weather he recommended that units that are stored in yards for any period be sprinkled slightly and yet regularly.

The session ended with an interested discussion among the members which was led by Mr. Allan, who further recommended that the 100 mesh be used and 1 1/6 mortar. He urged that manufacturers get down to fundamentals and then do all in their power to educate the bricklayer to use concrete products at every opportunity to the best advantage. In conclusion Mr. Allan was given a rising vote of thanks for his splendid addresses and constructive ideas, by the members in attendance. E. L. Warner of Tacoma held an impromptu demonstration of a sprinkling machine for an interested group. There were more than 60 members in attendance.

Products men do not work all of the time. At least here are W. H. Sharp, Hans Mumm Jr., E. B. Ballinger and H. A. Hall, officers of the Northwest Association, with a little offering for F. R. Zaugg, executive secretary, at the Rainier meeting

New Kentucky Quarry Enterprise

THE FORMATION of the Sunbeam Quarries Co., which proposes to open quarries in Bullitt county, Kentucky, to produce stone for building, railroad ballast, highway construction and agricultural purposes, and will employ a large amount of local labor, is announced by T. J. Beam, who is a son of J. B. Beam of Bardstown, Ky., and has been connected with the Russellville quarry at Russellville, Ky., and hence is an experienced quarry operator. The quarries will be located on the L. & N. R. R. at Clermont, Bullitt county, Ky., and have been thoroughly prospected during the last month by core drilling and test drilling the property, it was stated.

The stone has been found to possess excellent qualities for concrete aggregate, highway construction and railroad ballast, also containing a percentage of calcium carbonate, making it excellent material for the manufacture of agricultural limestone, according to the announcement, which adds that the lower strata are suited for dimension stone, and almost any thickness desired is obtainable.

Articles of incorporation will be drawn in a few days and equipment for the operation has been selected, which includes the newest and best obtainable, it was further announced, and that the crushing plant will have a daily capacity of 1500 tons and will have the most modern preparation plant in Kentucky. The handling equipment will include gasoline shovels and locomotives to haul the material to the crushing plant.

The location is declared to be very strategic on account of the Louisville market being only 25 miles from the quarries, this being the nearest commercial plant to this market. General offices and storage yards in Louisville will be maintained in connection with the quarries, it was also stated, and that quantities of all materials will be available for delivery at all times.

J. B. Beam of Bardstown will be identified with the company, as will several Louisville parties whose names will be announced later, it was stated.—*Bardstown* (Ky.) *Standard.*

Arthur C. Avril Enters Ready-Mixed Concrete Business at Cincinnati

A NEW MANUFACTURING COMPANY entered the Cincinnati, Ohio, business field recently when the Avril-Tru-Batch Concrete, Inc., acquired from the Bishopric Manufacturing Co. for $24,000 a tract of land measuring one and three-

Arthur C. Avril

fourths acres on Este avenue and the Baltimore and Ohio railroad, Winton Place. The firm will mix concrete at a central plant and will deliver it to construction jobs in trucks which are equipped with special bodies which prevent the concrete from drying and hardening.

A mixing plant to cost $20,000 will be built on the site acquired and will have a capacity of 450 cu. yd. of concrete per day.

Contractors who will utilize the services of the firm will be enabled to eliminate the mixing of concrete on their jobs or the acquiring of equipment. The product will be proportioned accurately by weight so that specifications will be strictly adhered to and a uniformly strong concrete will be produced at all times. The new plant will start operating in five weeks. Arthur C. Avril, president of the company, is a graduate of Ohio State University. He was until recently mining engineer for the France Stone Co., Toledo, Ohio.—*Cincinnati* (Ohio) *Commercial Tribune.*

Missouri Asphalt Corporation to Build Railway

A RAILROAD from Sheldon to Bellamy, Mo., a distance of seven miles, will be completed and the first train run over it September 1, according to J. E. Henderson, president of the Missouri Asphalt Corp., which has offices here. The road will be built to convey crushed rock asphalt from the mines near Bellamy to the main line of the railroad.—*Kansas City* (Mo.) *Star.*

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., at producing point or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.30	1.30	1.30	1.30	1.30	1.30
Chaumont, N. Y.	.50	1.75	1.75	1.50	1.50	1.50
Chazy, N. Y.	.75	1.75	1.60	1.30	1.30	1.30
Dundas, Ont.	.53	1.05	1.05	.90	.90	.90
Farmington, Conn.	.....	1.30	1.10	1.00	1.00	.....
Frederick, Mo.	.50@ .75	1.35@1.45	1.15@1.25	1.10@1.20	1.05@1.15	1.05@1.10
Ft. Spring, W. Va.	.35	1.30	1.30	1.25	1.20	1.15
Munns, N. Y.	1.00	1.25	1.25	1.25	1.15	.....
Prospect, N. Y.	1.00	1.40	1.25	1.25	1.25	.....
Rochester, N. Y.—Dolomite	1.50	1.50	1.50	1.50	1.50	1.50
St. Vincent de Paul, Que. (n)	.75	1.35	1.15	.95	.85	1.35
Walford, Penn.	.....	.....	1.35h	1.35h	1.35h	1.35h
Watertown, N. Y.	1.00	1.75	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL:						
Afton, Mich.	.....	.....	.....	.....	.....	.50@1.50
Alton, Ill.	1.85	.....	1.85	.....	.....	.....
Columbia and Krause, Ill.	1.05@1.40	.95@1.50	1.15@1.50	1.05@1.50	1.05@1.50	.....
Cypress, Ill.	1.00@1.25	1.00@1.25	1.20@1.25	1.20@1.25	1.20@1.25	1.35
Davenport, Iowa	1.00	1.50	1.50	1.30	1.30	1.40
Dubuque, Iowa	.85	1.00	1.25	1.25	1.25	.....
Greencastle, Ind.	1.35	1.10	1.10	1.00	1.00	1.00
Lannon, Wis.	1.00	1.00	1.00	.90	.90	.90
McCook, Ill.	1.00	1.25	1.25	1.25	1.25	1.25
Marblehead, Ohio (l)	.55	.80	.80	.80	.80	.80
Milltown, Ind.	.....	.90@1.00	1.00@1.10	.90@1.00	.85@ .90	.85@ .90
Northern Ohio Points	.85@1.15	1.25	1.15	1.15	1.15	1.15
Sheboygan, Wis.	1.10	1.10	1.10	1.10	1.10	1.10
Stone City, Iowa	.75	.....	1.20	1.10	1.00	.....
Thornton, Ill.	.90	1.00	1.25	1.25	1.25	1.25
Toledo, Ohio	1.60	1.70	1.70	1.60	1.60	1.60
Toronto, Canada (m)	2.50	3.00	3.00	2.85	2.85	2.85
Valmeyer, Ill. (fluxing limestone)	.90@1.20	.....	.....	1.75	.....	1.75
Waukesha, Wis.	.....	1.10	1.10	1.10	1.10	.90
Winona, Minn.	1.00	1.20	1.30	1.40	1.40	1.40
Wisconsin Points	.50	.....	1.00	.90	.90	.....
Youngstown, Ohio	.70j	1.25l@1.35h	1.25l@1.35h	1.25l@1.35h	1.25l@1.35h	1.25l@1.35h
SOUTHERN:						
Cartersville, Ga.	1.00	1.65	1.65	1.45	1.15	.....
Chico, Texas	1.00	1.30	1.25	1.20	1.10	1.05
Cutler, Fla.	.40r@ .75r	.....	.....	1.75r	.....	1.10r
El Paso, Tex.	1.00	1.00	1.00	1.00	1.00	.....
Graystone, Ala.	Crusher run, screened, $1 per ton					
Kendrick and Santos, Fla.	3½ in. and less, $1 per ton					
Olive Hill, Ky.	.....	1.00	1.00	1.00	1.00	1.00
Rocky Point, Va.	.50@ .75	1.40@1.60	1.30@1.40	1.15@1.25	1.10@1.20	1.00@1.05
WESTERN:						
Atchison, Kan.	.50	1.80	1.80	1.80	1.80	1.80
Blue Springs & Wymore, Neb.	.25	1.45	1.45	1.35c	1.25d	1.20
Cape Girardeau, Mo.	1.25	.....	1.25	1.25	1.00	.....
Rock Hill, St. Louis, Mo.	1.00	1.25	1.00@1.25	.90@1.25	.90@1.25	.90@1.25
Sugar Creek, Mo.	.75	1.00	1.20	1.20	1.20	1.20

(r) Cubic yard.

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Birdsboro, Penn. (q)	1.20	1.60	1.45	1.35	.....	1.30
Branford, Conn.	.80	1.70	1.45	1.20	1.05	.....
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
Knippa, Tex.	2.50	2.25	1.65	1.35	1.25	.....
New Britain, Plainville, Rocky Hill, Wallingford, Meridan, Mt. Carmel, Conn.	.80	1.70	1.45	1.20	1.05	1.05
Northern New Jersey	1.40@1.45	2.10	1.90	1.40@1.50	1.40@1.50	.....
Richmond, Calif.	.75	.....	1.00	1.00	1.00	.....
Spring Valley, Calif.	.75	1.10	1.10	1.10	1.10	.....
Springfield, N. J.	1.35@1.50	2.10	2.00	1.60	1.60	.....
Toronto, Canada (m)	.....	5.80	4.05	4.05	.....	.....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley, Montello and Red Granite, Wis.—Granite	1.80	1.70	1.50	1.40	1.40	.....
Cayce, S. C.—Granite	.....	.....	1.80	1.80	1.65	.....
Eastern Penn.—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Penn.—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Emathla, Fla.—Flint rock	1.00	.....	2.35	.....	.....	.....
Lithonia, Ga.—Granite	.75a	2.00b	2.00	1.60	1.40	1.35
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	.....
Middlebrook, Mo.	3.00@3.50	.....	2.00@2.25	2.00@2.25	.....	1.25@3.00
Richmond, Calif.—Quartzite	.75	.....	1.00	1.00	1.00	.....
Somerset, Penn. (sand-rock)	.....	.....	1.50 to 1.85	.....	.....	.....
Toccoa, Ga.	.....	.....	1.30	1.25	1.25	1.25

(a) Sand. (b) to ⅛ in. (c) 1 in., 1.40. (d) 2 in., 1.30. (e) Price net after 10c cash discount deducted. (f) 1 in. to ¼ in., 1.45; 2 in. to ¼ in., 1.35. High calcite fluxing stone. 1.40. (h) Less 10c discount. (j) Less 10% net ton. (l) Less .05. (m) Plus .25 per ton for winter delivery. (n) Crusher run for ballast, .85. (p) Carload prices. (q) Crusher run, 1.40; ¼-in. granolithic finish, 3.00. (r) Cubic yd.

Agricultural Limestone

(Pulverized)

Alton, Ill.—Analysis, 98% $CaCO_3$, 0.01% $MgCO_3$; 90% thru 100 mesh.. 6.00

Bettendorf and Moline, Ill.—Analysis, $CaCO_3$, 97%; 2% $MgCO_3$; 50% thru 100 mesh, 1.50; 50% thru 4 mesh 1.50

Blackwater, Mo.—100% thru 4 mesh.. 1.00

Branchton, Penn. — 100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh..... 5.00

Cape Girardeau, Mo.—Analysis, $CaCO_3$, 94½%; $MgCO_3$, 3½%; 90% thru 50 mesh..... 1.50

Cartersville, Ga.—50% thru 50 mesh.... 1.50

Pulverized, per ton..... 2.00

Chaumont, N. Y.—Pulverized limestone, bags, 4.00; bulk..... 2.50

Cypress, Ill.—Analysis, 88% $CaCO_3$; 10% $MgCO_3$; 50-90% thru 4 mesh.. 1.25
50-90% thru 100 mesh..... 1.35

Danbury, Conn., and West Stockbridge, Mass.—Analysis, 90% $CaCO_3$; 5% $MgCO_3$; fine ground, 90% thru 100 mesh; bulk..... 3.50
Paper bags 4.75
100 lb. cloth bags..... 5.25
(All prices less .25 cash 15 days)

Davenport, Ia.—Analysis, 97% $CaCO_3$; 2% and less $MgCO_3$; 90% thru 200 mesh, bags, per ton..... 6.00
90% thru 20 mesh, bulk, per ton..... 1.50

Hillsville, Penn.—Analysis, 94% $CaCO_3$; 1.40% $MgCO_3$; 75% thru 100 mesh; sacked..... 5.00

Hot Springs and Greensboro, N. C.—Analysis, $CaCO_3$, 98-99%; $MgCO_3$, 42%; pulverized; 67% thru 200 mesh; bags 3.95
Bulk 2.70

Jamesville, N. Y. — Analysis 89% $CaCO_3$, 4% $MgCO_3$; pulverized; bags 4.25

Joliet, Ill.—Analysis, 52% $CaCO_3$; 44% $MgCO_3$; 90% thru 100 mesh, 3.50; 50% thru 100 mesh, 2.50; 90% thru 30 mesh..... 2.00

Knoxville, Tenn.—80% thru 100 mesh; bags, 1.25; bulk..... 2.70

Marlbrook, Va.—Analysis, 80% $CaCO_3$; 10% $MgCO_3$; bulk..... 1.75

Marl—Analysis, 95% $CaCO_3$; 0% $MgCO_3$; bulk 2.25

Marion, Va. — Analysis, 90% $CaCO_3$, 2% $MgCO_3$; per ton..... 2.00

Middlebury, Vt. — Analysis 99.05% $CaCO_3$; 90% thru 50 mesh; bulk, 4.00; paper bags..... 5.00

Milltown, Ind. — Analysis, 94.50% $CaCO_3$, 33% thru 50 mesh, 40% thru 50 mesh; bulk..... 1.35@ 1.60

Olive Hill, Ky.—90% thru 4 mesh..... 1.00

Piqua, Ohio—Total neutralizing power 101.12%; 99% thru 10, 60% thru 50; 45% thru 100..... 2.50

100% thru 10, 90% thru 50, 70% thru 100; bags, 5.00; bulk..... 3.50

100% thru 4, 30% thru 100, bulk..... 1.50

Rocky Point, Va.—Analysis, $CaCO_3$, 97%; 50% thru 200 mesh, burlap bags, 3.50; paper, 3.25; bulk..... 2.00

Watertown, N. Y.—Analysis, 96-99% $CaCO_3$; 50% thru 100 mesh; bags, 4.00; bulk 2.50

Agricultural Limestone

(Crushed)

Bedford, Ind.—Analysis, 98% $CaCO_3$; 1%, $MgCO_3$; 95% thru 10 mesh..... 1.50

(Continued on next page)

Agricultural Limestone

Chico and Bridgeport, Tex. — 50% thru 100 mesh	1.50
Davenport, Ia.—Analysis, 97% $CaCO_3$; 2% and less $MgCO_3$; 90% thru 10 mesh, per ton	1.25
90% thru 4 mesh, per ton	1.10
Dubuque, Iowa—50% thru 4 mesh	.85
Dundas, Ont.—Analysis, 54% $CaCO_3$; $MgCO_3$, 43%; 50% thru 50 mesh	1.00
Ft. Spring, W. Va.—Analysis, 90% $CaCO_3$; 50% thru 50 mesh	1.00
Kansas City, Mo. — 50% thru 100 mesh	1.00
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% thru 10 mesh; 46% thru 60 mesh	2.00
Screenings (¼ in. to dust)	1.00
Marblehead, Ohio—90% thru 100 mesh	3.00
90% thru 50 mesh	2.00
90% thru 4 mesh	1.00
McCook, Ill.—90% thru 4 mesh	.90
Middlepoint, Bellevue, Bloomville, Kenton and Whitehouse, Ohio; Monroe, Mich.; Bluffton, Greencastle and Logansport, Ind.—85% thru 10 mesh, 20% thru 100 mesh	1.50
Moline, Ill., and Bettendorf, Iowa—Analysis, 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh	1.50
Mountville, Va. — Analysis, 76.60% $CaCO_3$; $MgCO_3$, 22.83%, 100% thru 20 mesh; 50% thru 100 mesh, paper bags, 4.50; burlap bags	5.00
Stone City, Iowa — Analysis, 98% $CaCO_3$; 50% thru 50 mesh	.75
Waukesha, Wis.—90% thru 100 mesh, 4.50; 50% thru 100 mesh	2.05
Valmeyer, Ill.—Analysis, 96% $CaCO_3$, 2% $MgCO_3$; 100% thru 10 mesh	1.10@1.70

Pulverized Limestone for Coal Operators

Davenport, Ia.—Analysis 97% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 20 mesh, 50% thru 200 mesh; paper sacks	6.00
Hillsville, Penn., sacks, 4.50; bulk	3.00
Joliet, Ill. — Analysis, 52% $CaCO_3$; 46% $MgCO_3$; 90% thru 100 mesh; paper bags (bags extra)	3.50
Marblehead, Ohio — Analysis, 83.54% $CaCO_3$; 14.92% $MgCO_3$; 99.8% thru 100 mesh; sacks	4.25
Piqua, Ohio, sacks, 4.50@5.00; bulk	3.00@ 3.50
Rocky Point, Va.—85% thru 200 mesh, bulk	2.25@ 3.50
Waukesha, Wis.—90% thru 100 mesh, bulk	4.50

Glass Sand

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

Cedarville and S. Vineland, N. J.	*1.75@ 2.25
Estill Springs and Sewanee, Tenn.	1.50
Franklin, Penn.	2.00
Klondike, Mo.	2.00
Massillon, Ohio	3.00
Michigan City, Ind.	.30@ .35
Ohlton, Ohio	2.50@ 3.00
Ottawa, Ill.	1.25
Red Wing, Minn.	1.50
Rockwood, Mich.	2.25@ 3.00
San Francisco, Calif.	4.00@ 5.00
Silica and Mendota, Va.	2.00
St. Louis, Mo.	2.00
Utica and Ottawa, Ill.	.75@ 1.00
Zanesville, Ohio	2.50

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Beach City, Ohio		1.50
Dresden, Ohio		1.25
Eau Claire, Wis.	4.25	
Estill Springs and Sewanee, Tenn.	1.35@1.50	1.35@1.50
Franklin, Penn.		1.75
Massillon, Ohio		2.00
Michigan City, Ind.		.30
Montoursville, Penn.		1.25
Ohlton, Ohio	2.00	2.00
Ottawa, Ill.	3.25	1.25
Red Wing, Minn.		1.00
San Francisco, Calif.	3.50	3.50

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Asbury Park, Farmingdale, Spring Lake and Wayside, N.J.	.65	.55	1.00	1.35	1.40	
Attica and Franklinville, N. Y.	.65	.65	.65	.65	.65	.65
Boston, Mass.‡	1.40	1.40	1.40		2.25	2.25
Buffalo, N. Y.	1.10	1.05	1.05	1.05		1.05
Erie, Penn.	.60	.80			1.40	
Leeds Junction, Me.		.50		1.75	1.25	1.00
Machias Jct., N. Y.	.85	.75	.75		.75	.75
Montoursville, Penn.	1.00	.75	.75	.60	.60	.60
Northern New Jersey	.60	.60		1.25	1.25	
Somerset, Penn.		2.00				
Troy, N. Y.	.50@ .75*	.50@ .75*	.80@1.00*	.80@1.00*		.80@1.00*
F. o. b. boat, per yd.	1.50	1.50	1.75	1.75		1.75
Washington, D. C.	.55	.55	1.30	1.30	1.00	1.00
CENTRAL:						
Attica, Ind.			All sizes .75@.85			
Aurora, Moronts, Oregon, Sheridan, Yorkville, Ill.	.50	.35	.20	.50	.60	.60
Barton, Wis.		.40	.60	.65	.65	.65
Columbus, Ohio¶	.65	.65	.65	.65		
Des Moines, Iowa		.40	1.50	1.50	1.50	1.50
Eau Claire, Chippewa Falls, Wis.		.40	.55@ .75	.85	.85	
Elkhart Lake, Wis.	.60	.40	.50	.60	.50	.50
Ferrysburg, Mich.		.50@ .80	.60@1.00	.60@1.00		.50@1.25
Grand Haven, Mich.		.60@ .80	.70@ .90	.70@ .90		.70@ .90
Grand Rapids, Mich.	.50	.50	.90	.80	.70	.70
Hamilton, Ohio		1.00	1.00		1.00	
Hersey, Mich.		.50		.60		.70
Humboldt, Iowa	.35	.35	1.35	1.35	1.35	1.35
Indianapolis, Ind.	.60	.60		.90	.75@1.00	.75@1.00
Mankato, Minn.		.45g		.60@1.25h	.70@1.25	1.25e
Mason City, Iowa		.50	.85	1.30	1.25	1.25
Mattoon, Ill.			.75@.85 all sizes			
Milwaukee, Wis.	.96	.91	1.06	1.06	1.06	1.06
Minneapolis, Minn.	.65*	.65*	1.75*	1.75*	1.75*	1.75*
St. Louis, Mo.	1.20e	1.45f	1.55a	1.45	1.45	1.45
St. Paul, Minn.	.35	.35	1.25	1.25	1.25	1.25
Terre Haute, Ind.	2.75	.60	.85	.75	.75	.75
Waukesha, Wis.		.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	1.50	1.25	1.15	1.10
SOUTHERN:						
Brewster, Fla.	.50	.50	3.00	3.00		
Brookhaven, Miss.	1.25	.70	1.25	1.00	.70	.70
Charleston, W. Va.			River sand and gravel, all sizes, 1.40			
Eustis, Fla.		.45				
Fort Worth, Texas		.75@1.25	1.00@1.10	1.00@1.25	1.00@1.35	1.00@1.35
Knoxville, Tenn.	1.00	1.00	1.20	1.20	1.20	1.20
Macon, Ga.	.65@ .90	.65@ .90	2.25@2.50	2.25@2.50	2.25@2.50	2.25@2.50
New Martinsville, W. Va.	1.10	1.00		1.30	1.10	.90
Roseland, La.	.35	.15	.85	.85	.75	.75
WESTERN:						
Kansas City, Mo.	.70	.70@ .75				
Crushton, Durbin, Kincaid, Largo, Rivas, Calif.	.10@ .40	.10@ .40	.50@1.00	.50@1.00	.50@1.00	.50@1.00
Oregon City, Ore.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Otay, Calif.		.35@ .50	.60	.60	.60	.60
Phoenix, Ariz. (k)	1.25*	1.15*	1.50*	1.25*	1.15*	1.10*
Pueblo, Colo.	.80	.60		1.20		1.15
Seattle, Wash.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Steilacoom, Wash.	.50	.50	.50	.50	.50	.50

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Algonquin and Beloit, Wis.			Dust to 3 in., .40			
Brookhaven, Miss.						.60
Buffalo, N. Y.	1.10	.95		.85		.85
Burnside, Conn.		.75*				
Des Moines, Iowa				.60		
Dresden, Ohio				.70	.65	
Eau Claire, Chippewa Fls., Wis					.65	
Fort Worth, Texas						.65@ .80
Gainesville, Texas						.55
Grand Rapids, Mich.				.50		
Hamilton, Ohio					1.00	
Hersey, Mich.				.50		.50
Indianapolis, Ind.			Mixed gravel for concrete work, at .65			
Macon, Ga.	.35					
Oregon City, Ore.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Somerset, Penn.		1.85@2.00		1.50@1.75		
Steilacoom, Wash.	.25					
St. Louis, Mo.			Mine run gravel, 1.55 per ton			
Summit Grove, Ind.	.50	.50	.50	.50	.50	.54
Winona, Minn.	.40	.40	.60	.60	.60	.60
York, Penn.	1.10	1.00				

*Cubic yd. ‡Delivered on job by truck. (a) ⅝-in. down. (b) River run. (c) 2½-in. and less. ¶By truck only. (d) Delivered in Hartford, Conn., $1.50 per yd. (e) Mississippi River. (f) Meramee River. (g) Washed and screened river sand. (h) ¾-in. to ¼-in. (j) Lake sand, 1.75, delivered. (k) 60-70% crushed boulders.

Core and Foundry Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

City or shipping point	Molding, fine	Molding, coarse	Molding, brass	Core	Furnace lining	Sand blast	Stone sawing
Albany, N. Y.	2.00	2.00	2.00	1.00@2.25	2.00	2.25@4.00	
Beach City, Ohio	1.50@2.00	1.75@2.00		1.50	1.50@1.75		1.50
Dresden, Ohio	1.25@1.50	1.25@1.50	1.50@1.75	1.00@1.25			
Eau Claire, Wis.						3.00	
Elco & Tamms, Ill.	Ground silica per ton in carloads—18.00@31.00						
Estill Springs and Sewanee, Tenn.	1.25			1.25		1.35@1.50	
Franklin, Penn.	1.75	1.75		1.75			
Kasota, Minn.							1.00
Kerrs, Ohio	1.10@1.50	1.25@2.00	2.00			2.75@3.00	
Massillon, Ohio	2.00	2.00		2.00	2.00		
Michigan City, Ind.				.30@ .35			
Montoursville, Penn.				1.50			
New Lexington, O.	2.00	1.25					
Ohlton, Ohio	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Ottawa, Ill.	1.00	1.25	1.50	1.75	1.25	3.50	2.00
Red Wing, Minn. (d)					1.50	3.00	1.50
San Francisco, Calif.[1]	3.50†	5.00†	3.50†	3.50@5.00†	3.50@5.00†	3.50@5.00†	
Silica, Mendota, Va.	Potters flint, 8.00@10.00g						
Utica & Ottawa, Ill.	.40@1.00f	40.@1.00f	.75@1.00	.40@1.00f	.60@1.00f	2.23@3.25	1.00@3.25
Utica, Ill.	.60	.70		.75	1.00		
Warwick, Ohio	1.50*@2.00	1.50*@2.00		1.50*@2.00			
Zanesville, Ohio	2.00	1.50	2.00	2.50	2.00		

*Green. †Fresh water washed, steam dried. [1]Core, washed and dried, 2.50. (d) Filter sand, 3.00. (e) Filter sand, 3.00@4.25. (f) Crude and dry. (g) also 12.00@14.00.

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y., Erie and Dubois, Pa.	2.25	1.25	1.25	1.35	1.25	1.25	1.25
Eastern Penn.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Northern N. J.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Reading, Penn.	2.00	1.00		1.25			
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	2.05*	1.30*	1.80*	1.45*	1.45*	1.45*	
Jackson, Ohio	2.05*	1.05*	1.80*	1.30*	1.05*	1.30*	
Toledo, Ohio	1.50	1.35	1.35	1.35	1.35	1.35	1.35
SOUTHERN:							
Ashland, Ky.		1.45*		1.45*	1.45*	1.45*	
Ensley and Alabama City, Ala.	2.05	.80	1.35	1.25	.90	.90	.80
Longdale, Roanoke, Ruesens, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.05
Woodward, Ala.†	2.05*	.55*		1.15*	.90*	.90*	

5c per ton discount on terms. †1¼ in. to ¼ in., $1.05; ⅝ in. to 10 mesh, $1.25*; ⅝ in. to 0 in., .90*; ¼ in. to 10 mesh, .80*.

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Berkeley, R. I.			12.00					2.00
Buffalo, N. Y.	11.50	7.50	7.50	12.00	8.00	11.00	7.50	1.50[16]
Lime Ridge, Penn.							5.00	
West Stockbridge, Mass.	12.00	10.00	5 60					2.00[12]
Williamsport, Penn.	10.00@11.00	8.50@9.00	8.50@9.00		7.00	9.00	5.00	
York, Penn., & Oranda, Va.	11.50[7]	8.50@9.50[7]	8.50@9.50[7]	8.50@10.50[7]	8.00	9.25	7.00	1.40[9]
CENTRAL:								
Afton, Mich.							7.50	1.35
Carey, Ohio	11.50	7.50	7.50		8.00		8.00	
Cold Springs, Ohio		8.00	8.00				8.00	
Gibsonburg, Ohio	11.50				8.00	10.00		
Huntington, Ind.	11.50	7.50	7.50	12.00	8.00	11.00	7.50	1.50[16]
Luckey, Ohio	12.50							
Milltown, Ind.		8.50@10.00		10.00[8]			8.50[22]	1.35[10]
Ohio points	11.50	7.50	7.50	12.00	8.00	11.00	7.50	1.50[16]
Scioto, Ohio	11.50	7.50	7.50	8.50	8.25	.62½	7.00	1.50
Sheboygan, Wis.		10.50	10.50				9.50	2.00[4]
Wisconsin points[6]		11.50					9.50	
Woodville, Ohio	11.50	7.50	7.50	12.50	8.00	10.00[9]	9.00	1.50[9]
SOUTHERN:								
El Paso, Texas							7.00	1.50
Frederick, Md.		8.00@9.50	8.00@9.50			9.50[15]	7.00[15]	
Graystone & Landmark, Ala.	12.50	9.00					7.00	1.35
Keystone, Ala.	19.00	9.00	9.00	10.00			7.50	1.35
Knoxville, Tenn.	19.00	9.00	9.00	9.00			7.50	1.35
Ocala, Fla.		10.00	9.00				10.00	1.40
WESTERN:								
Kirtland, N. M.							15.00	
Los Angeles, Calif.	15.00	14.00	12.00	18.00			13.50	
San Francisco, Calif.	19.50	16.00	12.50	16.00@19.50	14.50	.90[17]	14.50	1.85[17]
Tehachapi, Calif.[13]	10.80		6.75[11]	12.00			10.30	
Seattle, Wash.	19.00	19.00	12.00	19.00	19.00		18.60	2.30

[1] Barrels. [2] Net ton. [3] Wooden, steel 1.70. [4] Steel; in bbl. .95. [5] Dealers' prices, net 30 days less 25c discount per ton on hydrated lime and 5c per bbl. on lump if paid in 10 days. [7] In paper bags, including bags. [8] To 11.00. [9]80-lb. [10] To 1.50. [11] Refuse or air slack, 10.00@12.00. [12] To 3.00. [13] Delivered in Southern California. [15] To 8 00. [16] To 1.70. [17] Less credit for return of empties. [22] To 9.00. [30] To 16.50.

Miscellaneous Sands

(Continued)

City or shipping point	Roofing Sand	Traction
Utica & Ottawa, Ill.	1.00@ 3.25	.75
Warwick, Ohio		2.00
Zanesville, Ohio		2.50

*Damp.

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Chatsworth, Ga.:
- Crude talc (for grinding) 4.00@50.00
- Ground talc (20-50 mesh), bags 8.00
- Ground talc (150-200 mesh), bags 8.50@15.50
- Pencils and steel crayons, gross 1.00@ 2.00

Chester, Vt.:
- Ground talc (150-200 mesh), paper bags 9.00@10.00
- Same, burlap bags, bags extra 8.00@ 9.00

Chicago and Joliet, Ill.:
- Ground (150-200 mesh), bags 30.00

Cromleys Mt., Md.:
- Crude talc 63.00

Dalton, Ga.:
- Crude talc (for grinding) 5.00
- Ground talc (150-200 mesh), bags 12.00
- Pencils and steel worker's crayons, per gross 1.00@ 2.50

Emeryville, N. Y.:
(Double air floated) including bags;
- 325 mesh 14.75
- 200 mesh 13.75

Hailesboro, N. Y.:
- Ground white talc (double and triple air floated) 200-lb. bags, 300-350-mesh 15.50@20.00

Henry, Va.:
- Crude (mine run) 3.50@ 4.00
- Ground talc (150-200 mesh), bags 9.50@14.00

Joliet, Ill.:
Ground talc (200 mesh) in bags:
- California white 30.00
- Southern white 20.00
- Illinois talc 10.00

Keeler, Calif.:
- Ground (200-300 mesh), bags 20.00@30.00

Natural Bridge, N. Y.:
- Ground talc (300-325 mesh), bags 12.00@15.00

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

- Columbia, Tenn.—B.P.L. 65-70% 3.50@ 4.50
- Gordonsburg, Tenn.—B.P.L. 65-70% 3.75@ 4.00
- Mt. Pleasant, Tenn.—B.P.L. 72% 5.00@ 5.50
- Tennessee — F.o.b. mines, gross ton, unground brown rock, B.P.L. 72% 5.00
- B.P.L. 75% 6.00
- Twomey, Tenn.—B.P.L. 65%, 2000 lb. 8.00@ 9.00

Ground Rock

(2000 lb.)

- Centerville, Tenn.—B.P.L. 65% 8.00
- Gordonsburg, Tenn.—B.P.L. 65-70% 3.75@ 4.50
- Mt. Pleasant, Tenn.—B.P.L. 72% 5.00@ 5.50
- Twomey, Tenn.—B.P.L. 65% 8.00@ 9.00

Florida Phosphate

(Raw Land Pebble)

(Per Ton)

- Florida — F.o.b mines, gross ton, 68/66% B.P.L., Basis 68% 3.25
- 70% min. B.P.L., Basis 70% 3.75

Mica

Prices given are net, f.o.b. plant or nearest shipping point.

- Pringle, S. D.—Mine run, per ton 125.00
- Punch mica, per lb. .06
- Scrap, per ton, carloads 20.00
- Rumney Depot, N. H.—Per ton,
  - Mine run 300.00
  - Clean shop scrap 25.00
  - Mine scrap 22.50@24.00
  - Roofing mica 37.50
  - Punch mica, per lb. .12

Cut mica—50% from Standard List.

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Brandon, Vt. — English pink, English cream and coral pink	¶12.50@‖14.50	¶12.50@‖14.50
Brighton, Tenn.—Pink marble chips	$3.00	$3.00
Crown Point, N. Y.—Mica spar		9.00@10.00
Davenport, Ia.—White limestone, in bags	6.00	6.00
Easton, Penn.		8.00@ 9.00
Harrisonburg, Va.—Bulk marble (crushed, in bags)	†12.50	†12.50
Ingomar, Ohio—Concrete facings and stucco dash		11.00@18.00
Middlebrook, Mo.—Red		20.00@25.00
Middlebury, Vt.—Middlebury white	¶9.00@‖10.00	¶9.00@‖10.00
Middlebury and Brandon, Vt.—Caststone, per ton, including bags		4.00@ 5.50
Phillipsburg, N. J.—Royal green granite		14.00@18.00
Randville, Mich.—Crystalite crushed white marble, bulk	4.00	4.00@ 7.00
Rose pink granite, bulk		12.00
Stockton, Calif.—"Natrock" roofing grits		12.00@18.00
Tuckahoe, N. Y.—Tuckahoe white	10.00	
Warren, N. H.		¶7.90@‖8.95
Wauwatosa, Wis.		20.00@32.00
Wellsville, Colo. — Colorado Travertine Stone	15.00	15.00

†C.L. L.C.L. 16.00.
‖Bulk, car lots, minimum 30 tons.
¶C.L. ‖L.C.L.

Potash Feldspar

Auburn and Topsham, Me. — Color white, 98% thru 140-mesh	19.00
Buckingham, Ore.—White, analysis, K_2O, 12-13%; Na_2O, 1.75%; bulk	9.00
De Kalb Jct., N. Y.—Color, white; analysis, K_2O, 9.63%; Na_2O, 1.01%; SiO_2, 69.72%; Fe_2O_3, .00%; Al_2O_3, 18.6%; bulk (crude)	9.00
East Hartford, Conn.—Color, white, 40 mesh to 200 mesh	15.00@28.00
East Liverpool, Ohio—Color, white; 98% thru 200 mesh, bulk	19.35
Soda feldspar, crude, bulk, per ton	22.00
Glen Tay Station, Ont.—Color, red or pink; analysis, K_2O, 12.81%; crude	7.00
Keystone, S. D.—White; bulk (crude)	8.00
Los Angeles, Calif.—Color, white; analysis, K_2O, 12.16%; Na_2O, 1.53%; SiO_2, 65.60%; Fe_2O_3, .10%; Al_2O_3, 19.20%; Arizona spar, crude, bags, 12.50@14.00; bulk	11.00@12.50
Pulverized, 95% thru 200 mesh; bags, 19.73@23.50; bulk	15.75@22.50
Pulverized, 20% thru 80 mesh; bags, 17.60; bulk	16.50
Murphysboro, Ill.—Color, prime white; analysis, K_2O, 12.60%; Na_2O, 2.35%; SiO_2, 63%; Fe_2O_3, .06%; Al_2O_3, 18.20%; 98% thru 200 mesh; bags, 21.00; bulk	20.00
Penland, N. C.—White; crude, bulk	8.00
Ground, bulk	16.50
Spruce Pine, N. C.—Color, white; analysis, K_2O, 10%; Na_2O, 3%; SiO_2, 68%; Fe_2O_3, 0.10%; Al_2O_3, 18%; 99½% thru 200 mesh; bulk. (Bags 15c extra.)	18.00
Crude feldspar, bulk	10.00
Tenn. Mills—Color, white; analysis K_2O, 10%; Na_2O_3, 3%; 68% SiO_2; 99½% thru 200 mesh; bulk (Bags, 15c extra)	18.00
Toronto, Can.—Color, flesh; analysis K_2O, 12.75%; Na_2O, 1.96%; crude	7.50@ 8.00

Chicken Grits

Afton, Mich.(Limestone), per ton	1.75
Belfast, Me.—(Limestone), per ton	‡10.00
Chico and Bridgeport, Tex.—Hen	¶9.00
Baby chick, per ton	¶8.00
Danbury, Conn.; Adams, Ashley Falls, and West Stockbridge, Mass. (Limestone	‡7.50@*9.00
Davenport, Ia.—(Limestone) bags, per ton	6.00
Easton, Penn.—In bags	8.00
El Paso, Tex.—Per ton	1.00
Knoxville, Tenn.—Per bag	1.25
Los Angeles, Calif.—(Feldspar), per ton, including sacks	14.00
Marion, Va.—(Limestone), bulk, 5.00; bagged, 6.50; 100-lb. bag	.50
Middlebury, Vt.—Per ton	10.00
Randville, Mich.—(Marble), bulk	6.00
Rocky Point, Va.—(Limestone), 100-lb. bags, 50c; sacks, per ton, 6.00; bulk	5.00
Seattle, Wash.—(Gypsum), bulk, per ton	10.00
Tuckahoe, N. Y.	8.00
Waukesha, Wis.—(Limestone), per ton	8.00
Wisconsin Points—(Limestone), per ton	15.00
Winona, Minn.—(Limestone), sacked, per ton, $8.00; bulk, per ton	6.00

*L.C.L. †Less than 5-ton lots. ‡C.L. ¶100-lb. bags.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Albany, Ga.	10.00
Anaheim, Calif.	10.50@11.00
Barton, Wis.	10.50
Boston, Mass.	17.00*
Brighton, N. Y.	19.75*
Brownstone, Penn.	11.00
Dayton, Ohio	12.50@13.50
Detroit, Mich.	13.00@16.00*d
Farmington, Conn.	13.00
Flint, Mich.	18.00†
Grand Rapids, Mich.	12.50@14.50e
Hartford, Conn.	14.00@19.00*
Jackson, Mich.	13.00
Lakeland, Fla.	10.00@11.00
Lake Helen, Fla.	9.00@12.00
Lancaster, N. Y.	12.50
Madison, Wis.	12.00@12.50a
Mishawaka, Ind.	11.00
Milwaukee, Wis.	13.00*
Minneapolis, Minn.	10.00
New Brighton, Minn.	10.00
Pontiac, Mich.	12.50@15.00*
Pontiac, Mich.	12.00
Prairie du Chien, Wis.	18.00@22.50
Rochester, N. Y.	19.75
Saginaw, Mich.	13.50
San Antonio, Texas	16.00
Sebewaing, Mich.	12.50
Sioux Falls, S. Dak.	13.00
South River, N. J.	13.00
Syracuse, N. Y.	13.00@16.00
Toronto, Canada	15.00*
Wilkinson, Fla.	12.00@16.00
Winnipeg, Canada	15.00

*Delivered on job. †5% disc., 10 days. ¶Dealers' price. (a) Less 50c discount per M. 10th of month. (d) 5% disc., 10th of month. (e) Delivered in city limits.

Portland Cement

Prices per bag and per bbl., without bags, net in carload lots.

	Per Bag	Per Bbl.
Albuquerque, N. M.		3.70
Atlanta, Ga.		2.35
Baltimore, Md.		2.15‡@2.25
Birmingham, Ala.		2.10
Boston, Mass.	.68¼	2.13@2.73
Buffalo, N. Y.	.62½	2.00‡@2.50
Butte, Mont.	.90¼	3.61
Cedar Rapids, Iowa		2.24
Charleston, S. C.		2.35
Cheyenne, Wyo.	.64	2.56
Chicago, Ill.	.51¼	2.05
Cincinnati, Ohio		2.22
Cleveland, Ohio		2.24
Columbus, Ohio		2.22
Dallas, Texas		2.00
Davenport, Iowa		2.24
Dayton, Ohio		2.24
Denver, Colo.	.63¾	2.55
Des Moines, Iowa		2.05
Detroit, Mich.		1.90
Duluth, Minn.		2.04
Houston, Texas		2.00
Indianapolis, Ind.	.54¾	2.19
Jackson, Miss.		2.02
Jacksonville, Fla.		2.20
Jersey City, N. J.		2.03‡@2.13
Kansas City, Mo.		1.92
Los Angeles, Calif.	.60	2.40
Louisville, Ky.	.55½	2.22
Memphis, Tenn.		2.04
Milwaukee, Wis.		2.20
Minneapolis, Minn.		2.12@2.22
Montreal, Que.		1.60
New Orleans, La.		2.07
New York, N. Y.	.60¾	1.93‡@2.43
Norfolk, Va.		2.07
Oklahoma City, Okla.		2.46
Omaha, Neb.		2.36
Peoria, Ill.		2.22
Philadelphia, Penn.		2.11‡@2.21
Phoenix, Ariz.		3.91*
Pittsburgh, Penn.		2.04
Portland, Colo.		2.80
Portland, Ore.		2.40‡
Reno, Nev.		2.91
Richmond, Va.		2.24‡@2.40
Salt Lake City, Utah	.70¼	2.81
San Francisco, Calif.		2.21
Savannah, Ga.		2.50
St. Louis, Mo.		1.95
St. Paul, Minn.		2.12@2.22
Seattle, Wash.		2.70
Tampa, Fla.		2.25
Toledo, Ohio		2.20
Topeka, Kan.		2.41
Tulsa, Okla.		2.33
Wheeling, W. Va.		2.12
Winston-Salem, N. C.		2.29

Mill prices f.o.b. in carload lots, without bags to contractors.

	Per Bag	Per Bbl.
Albany, N. Y.	.43¾	1.75
Bellingham, Wash.		2.10
Buffington, Ind.		1.80
Chattanooga, Tenn.		2.45*
Concrete, Wash.		2.25
Davenport, Calif.		2.45*
Hannibal, Mo.		1.90
Hudson, N. Y.		1.75
Leeds, Ala.		1.65
Lime and Oswego, Ore.		2.50‡
Mildred, Kan.		2.35
Nazareth, Penn.		2.15
Northampton, Penn.		1.75
Richard City, Tenn.		2.05
Steelton, Minn.		1.85
Toledo, Ohio		2.20
Universal, Penn.		1.80

NOTE—Add 40c per bbl. for bags.
*Includes sacks. ‡10c discount, 15 days.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F.O.B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gauging Plaster	Wood Fiber	Gauging White	Plaster Sanded	Cement Keene's	Finish Trowel	—Plaster Board— ¼x32x 36". Per M Sq. Ft.	⅜x32x 36". Per M Sq. Ft.	Wallboard, ⅜x32 or 48". Lengths 6'-10'. Per M Sq. Ft.
Acme, Tex.	1.70	4.00	4.00	4.00	4.00	4.50	.....	.....	.....	.....	.....	15.00	20.00
Arden, Nev., and Los Angeles, Calif.	3.00	8.00u	8.00u	10.70u	10.70u	.....	.....	.....	.....	11.70u	.....	.....	.....
Blue Rapids, Kan.	1.70	4.00	.....	.....	.....	.....	10.00	.....	.....	.....	.....	15.00	20.00
Centerville, Iowa	3.00	10.00	15.00	10.00	10.00	10.50	13.50	.....	.....	13.50	.....	.....	.....
Des Moines, Iowa	3.00	8.00	9.00	10.00	10.00	10.50	13.50	12.00	24.00	22.00	18.00	21.00	30.00
Detroit, Mich.	.....	.....	.....	.....	14.30o	12.30m	.....	m9.00@11.00o	.....	.....	.....	.....	.....
Delawanna, N. J.	.....	.....	.....	.....	.....	.....	.....	7.25	.....	.....	13.00	14.00	.....
Douglas, Ariz.	.....	.....	6.00	14.50	15.00	.....	18.00	.....	30.00	.....	.....	.....	.....
Fort Dodge, Iowa	1.70	4.00	6.00	9.00	9.00	9.50	.....	.....	.....	19.00	.....	15.00	20.00
Grand Rapids, Mich.	2.65	4.00	6.00	6.00	9.00	9.00	17.65	.....	22.75	19.00	12.00	15.00	18.00
Gypsum, Ohio	1.70@3.00	4.00	6.00	7.00@9.00	9.00	9.00	19.00	7.00	24.50	19.00	.....	15.00	20.00@25.00
Los Angeles, Calif.	.....	7.50@9.00	7.50@9.00	.....	11.50@13.50	.....	.....	.....	.....	.....	.....	.....	.....
Medicine Lodge, Kan.	1.70	4.00	.....	.....	.....	.....	.....	.....	15.00	.....	.....	15.00	20.00
Port Clinton, Ohio	3.00	4.00	6.00	10.00	9.00	9.00	21.00	7.00	30.15	20.00	.....	20.00	30.00
Portland, Colo.	.....	.....	.....	10.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Francisco, Calif.	.....	.....	9.00	13.40	14.40	.....	15.40	.....	.....	.....	.....	.....	.....
Seattle, Wash. (b)	6.00	10.00	10.00	13.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sigurd, Utah	.....	.....	.....	.....	.....	.....	.....	.....	21.50	.....	.....	.....	.....
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00	.....	.....	.....	.....	20.00	25.00	33.00

NOTE—Returnable bags. 10c each; paper bags. 1.00 per ton extra (not returnable). (a) Hardwall plaster. 13.00; casting, finishing, molding, 14.00.
(b) Calacoustic plaster 10.00 at mill; (m) includes paper bags; (o) includes jute sacks; (u) includes sacks.

Market Prices of Cement Products

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point

City or shipping point	Sizes 8x8x16	8x10x16	8x12x16
Camden, N. J.	17.00	.....	.....
Cement City, Mich.		5x8x12—55.00¶	
Chicago District	200.00¶	.....	.....
Columbus, Ohio	16.00	.....	.....
Detroit, Mich.	.15@ .17†	.....	.24@.26†
Forest Park, Ill.	21.00*	.....	.....
Grand Rapids, Mich.	15.00*	.....	.....
Graettinger, Iowa	.16@ .18	.....	.....
Indianapolis, Ind.	.10@ .12a	.....	.....
Los Angeles, Calif.	4x8x12—5.00*	4x6x12—4.20*	
Olivia and Mankato, Minn.	9.50b	.....	.....
Somerset, Penn.	.18@ .20	.....	.....
Tiskilwa, Ill.	.16@ .18†	.....	.....
Yakima, Wash.	20.00*	.....	.....

*Price per 100 at plant. †Rock or panel face. (a) Face. ‡Delivered. ¶Price per 1000. (b) Per ton. (c) Plain. (d) 5x8x12—65.00 M, 5½x8x12—68.50 M.

Cement Roofing Tile

Prices are net per square, carload lots, f.o.b. nearest shipping point, unless otherwise stated.

Camden and Trenton, N. J.—8x12, per sq.	
Red	15.00
Green	18.00
Chicago, Ill.—Per sq.	20.00
Detroit, Mich.—5x8x12, per M	67.50
Houston, Texas—Roofing Tile, per sq.	25.00
Indianapolis, Ind.—9x15-in.	Per sq.
Gray	10.00
Red	11.00
Green	13.00
Waco, Texas:	Per sq.
4x4	.60

Cement Building Tile

Cement City, Mich.:	Per 100
5x8x12	5.00
Chicago District (Haydite):	
4x 8x16, per M	140.00
8x 8x16, per M	220.00
8x12x16, per M	300.00
Columbus, Ohio:	
5x8x12	6.50
Detroit, Mich.:	
5½x8x12, per M	75.00
Grand Rapids, Mich.:	
5x8x12	8.00
Longview, Wash.:	
4x6x12	5.00
4x8x12	6.25
Mt. Pleasant, N. Y.:	Per 1000
5x8x12	78.00
Houston, Texas:	
5x8x12 (Lightweight)	80.00
	Per 100
Pasadena, Calif. (Stone Tile):	Per 100
3½x4x12	3.00
3½x6x12	4.00
3½x8x12	5.50
Tiskilwa, Ill.:	Per 100
8x8	15.00
Wildasin Spur, Los Angeles, Calif. (Stone-Tile):	Per 1000
3½x6x12	50.00
3½x8x12	60.00
Prairie du Chien, Wis.:	
5x8x12	82.00
5x4x12	46.00
5x8x 6 (half-tile)	41.00
5x8x10 (fractional)	82.00
	Each
Yakima, Wash. (Building Tile):	
5x8x12	.10

Cement Drain Tile

Graettinger, Iowa.—Drain tile, per foot: 5-in., .04½; 6-in., .05½; 8-in., .09; 10-in., .13; 12-in., .17½; 14-in., .25; 16-in., .32; 18-in., .40; 20-in., .50; 24-in., .80; 26-in., 1.00; 28-in., 1.10; 30-in.	1.25
Longview, Wash.—Drain tile, per foot: 3-in., .05; 4-in., .06; 6-in., .10; 8-in., .15; 10-in.	.20
Olivia and Mankato, Minn.—Cement drain tile, per ton	8.00
Tacoma, Wash.—Drain tile, per M:	
3 in.	40.00
4 in.	50.00
6 in.	75.00
8 in.	100.00
Waukesha, Wis.—Drain tile, per ton	8.00

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	25.00@40.00
Baltimore, Md. (Del. according to quantity)	15.50	22.00@50.00
Camden and Trenton, N. J.	17.00	.....
Chicago District	16.00	.....
Columbus, Ohio	16.00	17.00
El Paso, Tex. — Clinker	13.00	13.00
Ensley, Ala. ("Slagtex")	14.50	22.50@33.50
Eugene, Ore.	25.00	35.00@75.00
Forest Park, Ill.	.....	37.00
Friesland, Wis.	22.00	32.00
Longview, Wash.*	15.00	22.50@65.00
Milwaukee, Wis.	14.00	32.00
Mt. Pleasant, N. Y.	.....	14.00@ 23.00
Omaha, Neb.	18.00	30.00@ 40.00
Pasadena, Calif.	10.00	.....
Philadelphia, Penn.	14.75	16.50@ 20.00
Portland, Ore.	17.50	23.00@ 55.00
Mantel brick—100.00@150.00		
Prairie du Chien, Wis.	14.00	22.00@ 25.00
Rapid City, S. D.	18.00	30.00@ 35.00
Waco, Texas	16.50	32.50@125.00
Watertown, N. Y.	20.00	35.00
Westmoreland Wharves, Penn.	14.75	20.00
Winnipeg, Man.	14.00	22.00
Yakima, Wash.	22.50	.....

*40% off List.

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted

Culvert and Sewer	4 in.	6 in.	8 in.	10 in.	12 in.	15 in.	18 in.	20 in.	22 in.	24 in.	27 in.	30 in.	36 in.	42 in.	48 in.	54 in.	60 in.
Detroit, Mich.								15.00 per ton									
Detroit, Mich. (c)																	
Sewer	.10	.12	.22	.30	.40	.60	.90	1.20	.....	1.75	2.00	2.50	3.30	4.50	5.75	6.50	8.00
Culvert	.....	.....	.....	.....	.95	1.25	1.60	.....	.....	2.25	2.50	3.00	3.50	5.00	6.50	8.00	10.00
Grand Rapids, Mich.	4 in. to 12 in., 72% off standard sewer price list; 15 in., 65% off; 18 in. to 24 in., 62% off; 27 in. to 36 in., 60% off																
Houston, Texas	.....	.19	.28	.43	.55½	.90	1.30	.....	1.70†	2.20	.....	.....	.....	.....	.....	.....	.....
Indianapolis, Ind. (a)	.....	.....	.....	.75	.85	.90	1.15	.....	.....	1.60	.....	2.50	.....	.....	.....	.....	.....
Longview, Wash.	Sewer pipe 40% off list; culvert—list																
Mankato, Minn. (b)	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.50	1.75	2.50	3.25	4.25	.....	.....	.....
Newark, N. J.	6 in. to 24 in., $18.00 per ton																
Norfolk, Neb. (b)	.....	.....	.....	.90	1.00	1.13	1.42	.....	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Olivia, Mankato, Minn.	12.00 per ton																
Paullina, Iowa‡	.....	.....	.....	.....	.....	.....	.....	2.25	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Somerset, Penn.	.....	.....	.....	.....	1.08	1.25	1.65	.....	.....	2.50	.....	3.65	4.85	7.50	8.50	.....	.....
Tiskilwa, Ill. (rein.)	.....	.....	.....	.75	.85	.95	.70	1.55	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tacoma, Wash.	.15	.18	.22½	.30	.40	.55	.75	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wahoo, Neb. (b)	.....	.....	.....	.....	1.00	1.13	1.10	1.60	.....	1.90	.....	2.25	3.40	.....	5.50	.....	.....
Yakima, Wash.	.....	.....	.....	.....	.....	.....	1.42	.....	.....	2.11	.....	2.75	3.58	4.62	6.14	6.96	7.78

(a) 24-in. lengths. (b) Reinforced. (c) Delivered on job; 5% discount, 10th of month. †21-in. diam. ‡Price per 2-ft. length.

Recent Contract Prices

CONTRACTS recently let for bids received on rock products are as follows:

Tokepa, Kan.—City commission let a contract for rock dust for asphalt work to the Fort Scott Cement Co. at $4.70 per ton.

Morrison, Ill.—Edward Hills, county superintendent of highways, let a contract to F. G. Hutchinson of Polo, Ill., for gravel for road work at $1.14 per cubic yard.

Amboy, Ill.—The county superintendent of highways let a contract for gravel for road work to Branigan Bros. of Amboy for 1500 cu. yd. at $0.95 per cu. yd. Another contract went to F. J. Detig Steward for 1500 cu. yd. at $1 per cu. yd., and another to C. A. Ullrich, Franklin Grove, for 540 yd. of crushed gravel at $1.29.

Iowa Road Gravel Prices

THE FOLLOWING paragraphs are taken from the official "Weekly Letting Report" of the Iowa State Highway Department and give typical examples of contract prices for road gravel at the present time:

"Van and Van, Hull, Iowa—4447 cu. yd. gravel, crushed, screened and hauled one mile at 30c; 2075 cu. yd. gravel, crushed, screened and hauled one mile at 35c; 1500 cu. yd. gravel, crushed, screened and hauled one mile at 40c; 27,600 units at 6c; 9150 units at 75c; 3150 units at 8c.

"Lynch County, Castana, Iowa—6600 cu. yd. gravel, crushed, screened and hauled one mile at 35c; 46,875 additional units at 6½c.

"Sioux County—On June 29, seven bids were received on Project M-360 and contract awarded to Kamiga and Rensink, Boyden, Iowa, as follows: 17,475 cu. yd. gravel, crushed, screened and hauled one mile at 24c; 199,115 units at 6c.

"Kaminga and Rensink, Boyden, Iowa—1450 cu. yd. gravel, crushed, screened and hauled one mile at 26c; 16,875 additional units at 6c.

"Van and Van, Hull, Iowa—8250 cu. yd. gravel, crushed, screened and hauled one mile at 28c; 900 cu. yd. gravel, crushed, screened and hauled one mile at 35c; 32,425 units at 6c; 3250 units at 7c; 53,750 units at .059c.

David M. Kirk Resigns from Crescent Cement Company

D. M KIRK, president of the Crescent Portland Cement Co. tendered his resignation July 17. Joseph Heidencamp of Pittsburgh was elected president and J. Sharp Wilson was named manager of the plant at Crescentville, Penn.—*Pittsburgh* (Penn.) *Sun-Telegraph.*

Keystone Portland Cement Plant Begins Operation

ALLENTOWN, Penn., the center of the great cement industry, has contributed the leading figures in a ceremony of much significance to the cement world when Fred B. Franks, Sr., veteran cement manufacturer, lighted the fires in the largest kiln for cement making in the world. It is a part of the new plant of the Keystone Portland Cement Co., near Bath, of which Mr. Franks is also founder and builder. Ten minutes after the fire had been built coal was fed to the kiln. An hour later the slurry was turned in and soon afterward clinker was discharged from the immense apparatus, which is 250 ft. long and 13 ft. 3 in. in diameter, the largest ever made.

The Keystone plant is a shining landmark of the Lehigh cement region. It is on an area of 400 acres, underlaid with as fine a lot of rock as any in this section. The machinery was obtained from Germany, the installation having been in charge of Dr. Bruno Bruhn, who during the war was managing director of Krupp's.

John Barnes of Philadelphia is president of the company. Mr. Franks is vice-president and general manager. The plant is a distinct feature of the eastern cement territory, which extends from Edison, N. J., across Northampton and Lehigh counties to Evansville, in Berks, forming the foremost cement-producing territory in America.—*Philadelphia* (Penn.) *Inquirer.*

Rock Asphalt Plant Sold by Court

ALL PROPERTIES of the Cherokee Rock Asphalt Co., Florence, Ala., were offered for sale June 30 at noon at the Colbert county court house, Tuscumbia, by W. R. Strickland, receiver.

Listed among the assets were the asphalt plant, machinery for preparing paving material, crushers, motors, conveyers and other equipment, various buildings located on the company's property, four acres of ground on which the plant is located, five acres of right of way, and leases, options and concessions.

The plant was sold to James C. Blythe, St. Louis, Mo., whose bid was $15,200. The buyer did not announce his plans for the future of the properties. The sale is subject to confirmation by Judge Grubb of the United States district court of northern Alabama, the sale being made under a decree by him on April 13, 1928.

Norman G. Hough Becomes Manager, National Lime Association

WE SELDOM PRINT a man's portrait in two successive issues of ROCK PRODUCTS, but events since our July 21 issue justify our repeating the portrait of Norman G. Hough, for in the intervening two weeks he has been persuaded to become manager of the National Lime Association. As noted in the July 21 issue, Mr. Hough was formerly manager of the Hydrated Lime Bureau, the first real promotional organization of the lime industry in this country, and since then he has had extensive experience in sales and executive work with the Universal Gypsum Co. and its successor, the Universal Gypsum and Lime Co.

Norman G. Hough

Mr. Hough is expected to take up his duties in Washington, D. C., not later than August 10. With him in his new work go the best wishes and co-operation of ROCK PRODUCTS and his many friends in the lime industry of long standing.

Cement Company Incorporated in Idaho

ARTICLES OF INCORPORATION were filed July 19 for the Idaho Portland Cement Co. with a capitalization of $500,000.

Pocatello men, headed by H. R. Turner, are interested in a plan to erect a cement mill of 1000 bbl. capacity at Inkom, 12 miles south of Boise. A. J. Lindsay of Spokane is named as one of the incorporators. A meeting of stockholders was held at Boise July 24 to complete details of the proposed mill.—*Boise* (Idaho) *Statesman.*

Big Bulk Shipment of Kansas Cement Handled at Both Ends by Pumping

A SHIPMENT of 28,000 bbl. of cement, the first bulk shipment ever to leave the Bonner Springs plant of the Kansas Portland Cement Co., for road purposes, was loaded recently for a road project in Iowa. The method of handling cement opens a new system of cement handling, a plan which may eventually cheapen the cost of public road building, according to G. A. Patterson, sales representative of the company, who arranged for the shipment to Reed and Wheelock, Kansas City road contractors, who are doing a 7½-mile concrete job in southern Iowa. The cement is pumped into air-tight box cars by a pneumatic cement pump. The same kind of a pump is used at the destination to pump the cement from the car direct to the concrete mixers on the road. The handling and cleaning of numerous sacks is avoided and the contractor does away with a storehouse and the cost of hauling the material from one plant to another.—*Kansas City* (Mo.) *Star.*

Note on the A.S.T.M. Definitions of "Brick" and "Concrete"

SIR: A copy of the July 7 issue of ROCK PRODUCTS has been received and I wish to express my appreciation of the very interesting and complete account appearing therein of the recent annual meeting of the American Society for Testing Materials. I wish to refer to only one or two items in the account that have to do with definitions of terms, for I know you would wish to have brought to your attention certain inaccuracies reported in respect to the actions taken. The definition for "brick," for example, was not adopted as standard, nor in fact was it recommended as either a tentative or a standard definition, but was merely submitted as information. The definition will receive consideration in Committee E-8 on Nomenclature during the coming year.

Similarly, the definition of "concrete" was not recommended for advancement to standard, but was merely included in the Report of Committee E-8 as information. The recommendation of Committee D-4, presented on the floor of the meeting, was to the effect that a wording recommended by Committee D-4 two years ago be included with the suggested wording in the Report of Committee E-8.

The statements appearing in ROCK PRODUCTS challenged my attention, I suppose, because of my especial interest in the work of Committee E-8 on Nomenclature and Definitions, and it is in view of this that I am writing to you at this time.

R. E. HESS,
Assistant Secretary, A.S.T.M.

Philadelphia, Penn.,
July 18, 1928.

National Crushed Stone Directors Meet at Atlantic City

Cleveland, Ohio, Chosen for 1929 Annual Convention

CLEVELAND, OHIO, the week following the Road Show (January 14-18), and two weeks following the National Sand and Gravel Association convention (January 7-10), was selected as the 1929 convention city by the National Crushed Stone Association directors, at their annual meeting, Atlantic City, N. J., July 27. The convention will come as usual in the third week of January—the 21st to 24th inclusive.

The principal other business transacted by the directors was to recommend that the association be incorporated, or that a trust be incorporated to hold the property of the association. The details were left to the executive committee. It was also recommended that a change be made in the method of collecting the dues of associate members, so that these will all become payable on January 1, instead of being spread throughout the calendar year, as at present.

The establishment of a standard depreciation scale for the various types of machinery and equipment used in the industry was discussed in some detail. The association has been invited by the Bureau of Internal Revenue, U. S. Treasury Department, to establish such a scale, as other industries have done. It was the consensus of opinion of those present that standard depreciation scales were practical impossibilities in such an industry as the operation of quarries and crushing plants, because of the great variation in local factors which affect the life of equipment.

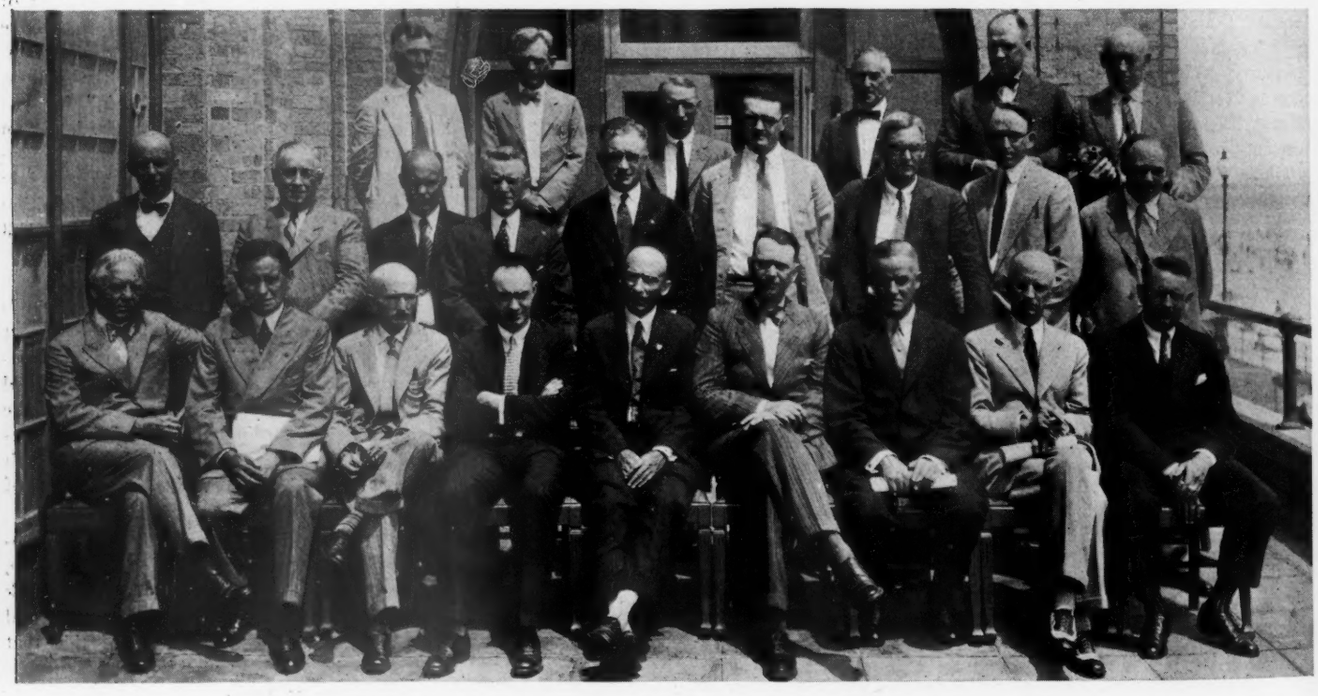
President Otho M. Graves, who has almost entirely recovered from a recent severe illness, presided at the meeting, with his old-time forcefulness and eloquence. A resolution was unanimously passed sincerely expressing the thankfulness of those present for his recovery, and highly complimenting him for the work he has done for the association.

A. T. Goldbeck, director of the Bureau of Engineering, presented a progress report on the work of the bureau. He is much pleased with the new headquarters, and with development of the testing laboratory. The research committee of the association, of which John W. Stull, Liberty Lime and Stone Co., Rocky Point, Va., is chairman, has a research program mapped out which will keep the laboratory busy for many months. These researches involve both the use of stone in concrete and in bituminous pavements.

J. R. Boyd, secretary, reported briefly the activities of the association's office for the first half of the current year. Local meetings of crushed stone producers have been held at St. Louis, Mo.; Dubuque, Iowa; Chicago, Ill.; Cleveland, Ohio; Harrisburg, Penn.; and Richmond, Va. The financial condition of the association was reported to be healthful. There are now 195 crushed-stone firms with a total of 1204 individual memberships in the National Crushed Stone Association. There are 79 associate members, or machinery firms.

Road Show Has Growing Attendance

REGISTERED ATTENDANCE at the annual Convention and Road Show has steadily grown during the past six years. Registered delegates at the 1923 session were estimated to total a little over 6000. This figure jumped to 15,500 in 1924, and continued to climb until in 1928 more than 22,000 road builders were registered.



National Crushed Stone Association directors and guests at Atlantic City

Front row, left to right: John Rice, H. E. Hopkins, E. E. Evans, J. R. Boyd, A. T. Goldbeck, Otho M. Graves, C. M. Doolittle, E. J. Krause, A. L. Worthen; second row, left to right: F. T. Gucker, F. O. Earnshaw, M. B. Garber, C. B. Andrews, H. E. Bair, F. W. Schmidt, T. I. Weston, W. F. Wise, Nathan C. Rockwood; third row, left to right: Thos. McCroskey, H. E. Rodes, John W. Stull, W. L. Sporborg, J. E. Cushing, James Savage

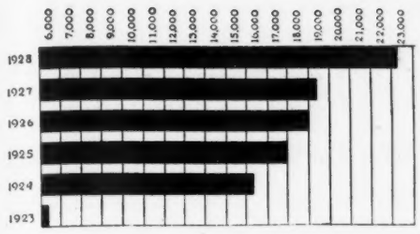


Chart showing growth in annual road show attendance

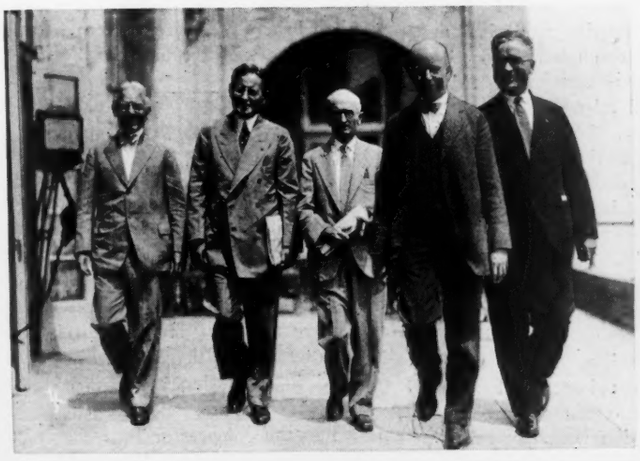
The widely expanded activities of the association indicate that the 1929 Convention and Road Show will reach a still higher mark from an attendance standpoint. The accompanying chart will indicate the rapid increase.

Road Through Gypsum Sands

THE ROAD from Alamogordo around the famous White (gypsum) Sands, through Saint Augustine pass to Las Cruces, N. M., has been under construction for some time. The construction crew has experienced the greatest difficulty in building this road owing to troublesome local conditions on the "gyp" flats and lack of materials fitted to road construction. At the moment a part of the road has been plated with red clay found in the bottom of an arroyo five miles out of Alamogordo. The west section of the road is being surfaced with gravel found in the San Andreas wash.—*El Paso* (Texas) *Herald.*

Messrs. Goldbeck, Boyd and Graves

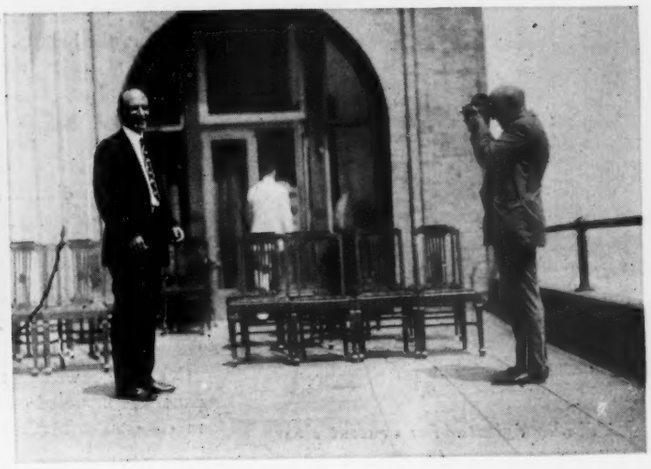
Messrs. Doolittle, Krause and Worthen



Messrs. Rice, Hopkins, Evans, Gucker and Bair

Messrs. Stull, Rodes, Cushing, Sporborg, Earnshaw and Rockwood

Messrs. Garber, Andrews and McCroskey

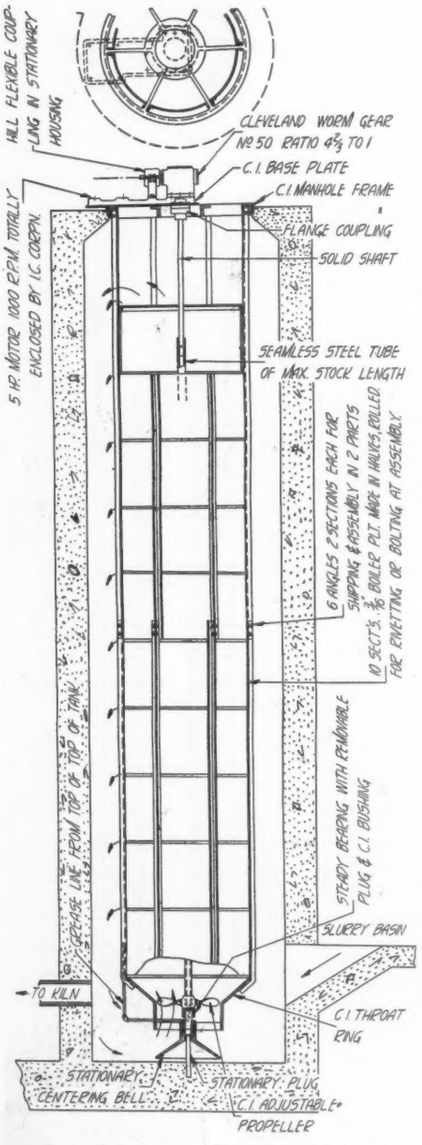


Messrs. Goldbeck and Savage in an unusual pose

New Machinery and Equipment

New Tubular Agitator for Slurry

THE Hill Clutch Machine and Foundry Co., Cleveland, Ohio, have announced a new development in the marine propeller type of slurry agitator which the company has been manufacturing for 30 years. The agitator consists of a vertical circular tube of heavy sheet steel with vertical angles which extend to the top of the slurry tank and bolt to the structural drive frame. The tube proper extends from near the bottom of the tank to near the top, and has an inside skirt at the bottom (either of sheet steel or cast iron) which reduces its diameter to that of the propeller which operates in this throat. The tube has four or more circular slots, equally spaced, proportioned to allow intermixing through them, but restricted sufficiently to force circulation over the top. Direct rotation is such that circulation is up in the center, down on the outside.



Tubular agitator for cement slurry

A stationary steel plug sets in the bottom of the tank and acts as a centering pin. No weight is carried on this pin. A spider in the throat ring holds a removable steel plug, and the propeller hub has a removable cast iron bushing riding on this plug. Both of these parts are subject to wear and are replaceable. Extreme wear is permissible in both the bushing and the plug without affecting the operation of the propeller shafts and no weight is carried on this bearing. Alemite lubrication is provided, which further insures long life of this bottom bearing. The weight of the propeller shaft and propeller thrust are carried on ball or roller bearings at the top of the tank.

Advantages claimed for the new agitator are:

(1) Low horsepower consumption. The marine propeller does not develop eddy currents, turbulence or violent local agitation. Power is expended only in producing a smooth flowing current through the propeller throat sufficient to overcome the skin friction of the tank and tube.

(2) Short mixing time. The combination of inter-mixing and circulation starts immediately throughout the entire volume, and consequently uniformity is reached in the shortest possible time.

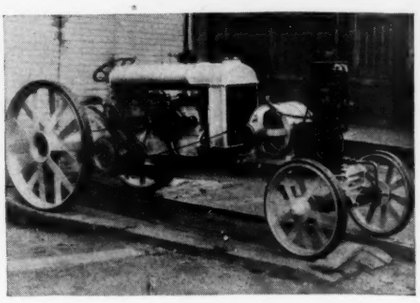
(3) Uniformity of mix. The rapid circulation and mixing, with no dead areas in the tank completely eliminate segregation, precipitation or deposits.

(4) Intermittent operation. Power need only be applied for short intervals before use except when used in continuous process tanks. A slurry correction tank can stand over night and within 15 minutes after starting complete uniformity of the mixture is reached. Heavy deposits which have not completely solidified are immediately cleaned up from the bottom.

Several units mounted on a revolving bridge will properly agitate a slurry basin of any size. Single units are primarily designed for installation in separate, relatively small, correction tanks. The largest built to date are 16 ft. in diameter and 26 ft. deep.

New Mounting for Arc Welder

A NEW mounting of the standard Lincoln electric stable arc welders has been announced by the Pontiac Tractor Co., Pontiac, Mich. The welder unit with stablizer and panel are mounted on a frame which attaches to either the McCormick-Deering 10/20 or Fordson tractor. This mounting of the Pontiac Lincoln arc welder gives a four-wheel rubber tired self-propelled unit capable of



New tractor mounting for stable arc welder

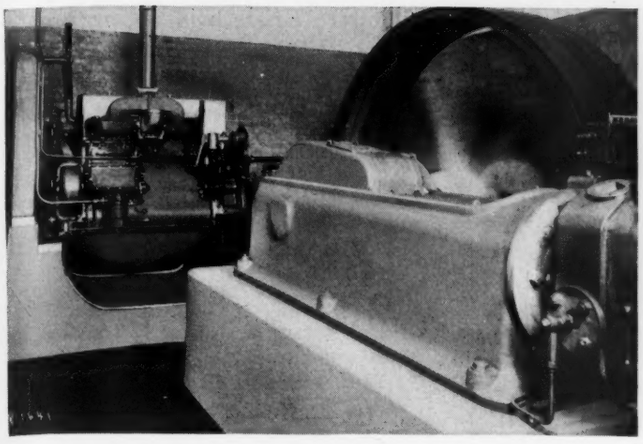
hauling heavy leads behind itself. This unit is also mounted on crawlers for soft ground work.

Power is taken from the tractor, to drive the welder, through the power takeoff pulley, which has a clutch, allowing it to be thrown out or into gear at will. The ahead drive of the belt brings the belt tightener into the correct relation with the belt.

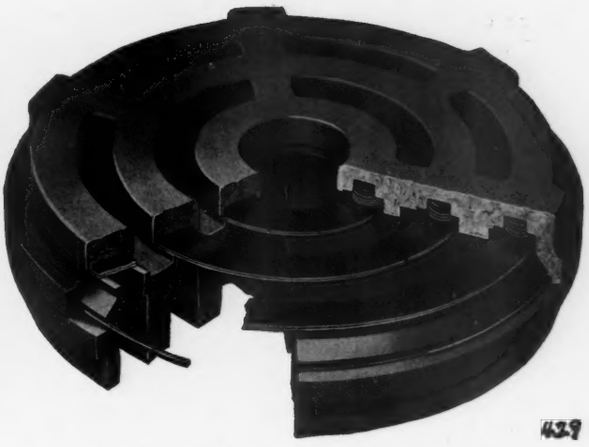
Air Compressor Driven by High-Speed Diesel Engine

A NEW application of Diesel power is found in the accompanying illustration, which shows a two-stage 16x10x14-in. air compressor of the horizontal type driven by a four-cylinder Buda-M.A.N. Diesel engine of 6-in. bore and 8-in. stroke built by the Buda Co. of Harvey, Ill. A twin disc clutch is enclosed in a housing bolted directly to the flywheel enclosure, and the engine is connected to the compressor by means of a short belt and idler pulley. The compressor will deliver 400 cu. ft. of air per minute against a pressure of 130 lb. per sq. in., and the air is used to operate Harris air-lift pumps in a deep well, raising the water from a depth of approximately 167 ft. and delivering it to a storage tank. The engine is the full Diesel type, with a normal operating speed of 1000 r.p.m. and rated at 92-hp. at that speed. The actual brake-horsepower load varies from 80 to 87-hp.

Fuel is fed to the injection pump on the engine by gravity, and a Zenith duplex filter is installed in the line to remove any foreign matter. The fuel is injected by the mechanical or solid-injection system, which is under control of the built-in governor, although the speed of the engine can be controlled manually as well as by the governor. The fuel is taken to dividers mounted on the cyl-



Installtion of Diesel engine driving an air compressor



Air-cushioned valve for air compressors

inner jacket, from which it is delivered to spray nozzles on opposite sides of the combustion chamber of each cylinder. The nozzles are so arranged that the "sprays" pass to each side of the radial center line of the combustion chamber so that the fuel spray cones do not meet, thereby causing turbulence of the oil particles. Consequently, combustion is complete and efficient, it is claimed, and it is stated that the fuel consumption ranges from 0.04 to 0.45 lb. per brake-horsepower, and that smoke is absent from the exhaust under widely varying loads and speeds.

Lubrication is accomplished by means of a positive gear-driven pump of large capacity, a pressure of 45 lb. per sq. in. being maintained. All moving parts are enclosed to promote cleanliness and lubricating oil economy, and a filter cleans all oil before it passes back into the engine. A small air-cooled, two-cylinder, opposed-type, gasoline engine, shown at the right in the accompanying illustration, is mounted on the flywheel housing and is used for starting duty. This engine is connected by a conventional type Bendix gear through a manually operated clutch and a short roller-chain drive. The Diesel starts with the same kind of fuel used for regular operation, and no compressor or preheating devices are required.

This engine was installed several months ago for the purpose of observation and test, and is operated by the regular power-house attendants. The only attention required is limited to a brief visit of the engineer several times a day.

New Creeper Dump Wagon

BIEHL IRON WORKS, INC., of Reading, Penn., have announced a new creeper dump wagon in four sizes—3-yd., 5-yd., 8-yd. and 10-yd. capacity. It is claimed that the front construction of the new dump wagon is different from any crawler-type wagon on the market. The front axle is made of high quality chrome nickel steel protected by a heavy electric steel casting and is connected with the front end of the wagon with an oversize king pin sufficiently strong to stand up under hard use which this equipment is subject to. The front wheels on the 8- and 10-yd. wagons are double disc steel wheels equipped with heavy electric steel hub castings and fitted with Timken tapered roller bearings, having the necessary dust collars and dust cap.

The Biehl creeper dump wagon is built exceptionally heavy throughout and mounted on heavy-duty 15-ton capacity creeper wheels. These wagons can be pulled any place by a crawler tractor, it is claimed, since they are designed as tractor wagons to use the full power of a crawler tractor in the moving of dirt and to operate economically behind a tractor of the crawler type. It is also stated that two of the larger type wagons are sufficient to serve any ordinary shovel.

Creeper dump wagon at work hauling quarry stone

New Air-cushioned Air Compressor Valve

THE Pennsylvania Pump and Compressor Co. has announced a new air-cushioned air compressor valve whose outstanding feature is its extreme simplicity, the company states. The company claims that the construction combines the utmost of durability and efficiency with the greatest element of safety. An important feature of the valve is the air cushion pocket in the guard. As the valve opens, instead of striking the guard, the discs enter this air pocket and the air trapped in the pocket provides a cushion which prevents the valve from striking the metal of the guard. This air cushion is an exclusive feature, which adds much to the life of the valve and its quietness of action, it is claimed.

The valve assembly is held together by means of a retaining ring, which engages the valve guard and seat. In the design and construction of this valve every precaution was taken to provide the greatest factor of safety, which is evident from the fact that there are no bolts, screws or nuts used in the construction, thus eliminating the possibility of any part becoming loose and falling into the cylinder, to do damage to the compressor.

Filter Manufacturers in New Merger

OLIVER UNITED FILTERS, INC., has been formed to take over and consolidate the United Filters Corp., Hazleton, Penn., and the Oliver Continuous Filter Co., Oakland, Calif., manufacturers of industrial filters and filtering machinery. The plants of both concerns will be continued in service. The new company will dispose of a stock issue to total about $2,600,000, a portion of the fund to be used for expansion and betterments. E. J. Sweetland, formerly president of United company, will be chairman of the board, and Edwin L. Oliver is to be president.

Work on New San Antonio Cement Plant to Start Soon

BIDS are being received for machinery and equipment for the Smith Brothers Properties, Inc., $2,000,000 cement plant on the Austin road, near San Antonio, Tex. Contracts will be awarded soon.

Test holes are being drilled on the property in preparation for actual construction work. Construction is expected to start the latter part of August.

The plant will be on a track off the Austin road, 10 miles north of San Antonio, between the I.-G. N. and M.-K.-T. tracks.—*San Antonio* (Tex.) *Express.*

Indianapolis Sand Producer Loses Suit Brought by City

THE State Sand and Gravel Co., Indianapolis, Ind., which was sued by the city of Indianapolis for violation of a city ordinance prohibiting a commercial enterprise within 500 ft. of a park, parkway or boulevard (Rock Products, July 7, 1928, p. 87), has lost its case in the federal court to prevent an injunction. The court held flatly that the city has a right to enact zone ordinances. Judge Baltzell had visited the site of the controversy in this case and was satisfied that excavations for gravel would affect the surrounding territory and might undermine the retaining walls along the river bank. It had been suspected that a removal of gravel from the streams, causing deep holes in the stream beds, has in some instances been responsible for damage to bridges through undermining of piers.

The argument presented by Thomas D. Stevenson, attorney for the company, contended that the ordinance amounted to confiscation of property in violation of the fourteenth amendment and that the United States Supreme Court had held in other cases that their cause was good where the ordinance is not reasonable. Mr. Stevenson explained that the suit did not question the right of the city to enact zoning ordinances, as the defense had attempted to interpret the suit, but argued that the confiscatory result was not reasonable.

New Northern Pacific Gravel Plant Begins Operations

GRAVEL WASHING operations were begun in the Horton gravel pit, about 10 miles west of Miles City, Mont., recently, following a delay of nearly a month. The plant was to have begun operations on June 20 last, but a storm in the early part of that month, blowing down about 500 ft. of the trestle, a part of the plant equipment, delayed the plan.

The gravel will be used on the Northern Pacific railroad roadbed between Custer and Mandan, N. D.

The plant is operated by electric current over high-tension wires stretching from Miles City. Excavation is under way on the brow of the hill upon which a small railroad is built to handle the material.

Oregon Limestone Deposit to Be Developed

DR. E. W. LAZELL, consulting engineer, of Portland, Ore., has just completed his trip to Grants Pass, Ore., for the Standard Lime and Plaster Co. property, having made a very complete survey of the limestone deposit, also the different locations that are under consideration for the plant.

Dr. Lazell was accompanied here by D. N. Littler, president of the company, and he reports that everything looks better than they had expected to find. The estimated tonnage on this property amounts to over 8,000,000 tons, giving the company raw products to keep an operation for over 100 years. The plant that is being ordered will be erected in units so that an increase of any given capacity can be added at any time. The first unit will handle 100 tons every 24 hours.

Agriculture limestone will be ground so that 100% will pass a 200-mesh and about 50% will pass a 300-mesh.

A screening plant will be included in the process so that any size of poultry grit may be taken out in quantity and quality to meet the growing demand for this commodity.

A considerable saving in manufacturing cost will be made by improving the roads and by hauling the large rock direct to the plant in South Grants Pass. In that way there is no rehandling and the rock never is touched by hand from the time it is loaded in the quarry car until it is loaded into the cars here at the plant for shipping.—*Grants Pass* (Ore.) *Bulletin.*

U. S. Government to Go Out of the Sand Business at Washington, D. C.

THE District of Columbia government will go out of the sand and gravel business and purchase these materials direct from contractors' plants, in accordance with action taken by the district commissioners recently on recommendation of Maj. L. E. Atkins, assistant engineer commissioner.

Maj. Atkins was a member of a special committee appointed by the commissioners to study the advisability of abolishing the sand and gravel wharf at Ninth and Water streets, S. W., and purchasing these supplies from contractors. The committee found such a change would effect a saving of $2500 a year in addition to a saving in the distance of hauling and other distinct advantages.

The committee also reported that the gravel obtainable from contractors is superior to that delivered to the district wharf, for the reason that the gravel obtained from the former has been rewashed.—*Washington* (D. C.) *Star.*

Concrete Materials Corporation to Operate Bethany, Mo., Quarry

THE BETHANY STONE QUARRY will begin operation the first week in August, it was announced recently by D. R. Keedwell of Independence, Mo., who has been brought here as superintendent for the Concrete Materials Corp. of Waterloo, Iowa, the new owner of the plant.

The new superintendent is an old, experienced quarryman, and at Independence has been with the W. M. Spencer Co., working a 24-ft. ledge of the Bethany Falls limestone. The ledge here is smaller than there, he says, running only about 15 ft. thick. This quarry has enough rock to keep working several years before exhausting the supply within its present bounds, he said.

One new piece of equipment came recently and was unloaded. It is a gasoline shovel on caterpillar treads. It will be used in stripping. Its dipper has a capacity of ¾ yd. The machine cost $11,500, according to J. J. Brockway, factory representative, who came here to unload it. It was sold by the Harnischfeger Sales Co. of Milwaukee, Wis.

Mr. Keedwell believes the quarry can turn out 300 to 400 yd. of crushed stone each shift, or from eight to ten cars.—*Bethany* (Mo.) *Clipper.*

A later item in the same newspaper states:

Just as the Bethany stone quarry was geting in shape to begin operations again after several years of idleness, another flood came down Big creek and turned the quarry pit into a lake.

With the rising waters endangering the earthen dike which had broken through only a month before, desperate efforts were made to hold the wall. About 25 loads of rock were dumped at the northwest corner of the pit, where the dike had broken before. Sacks of dirt also were used to hold back the water.

The creek continued to rise steadily and about 2 o'clock the next afternoon the water broke over at a new spot at the southwest side of the quarry. The deep hole filled up rapidly. Later in the afternoon the flood waters reached up above the dike most of the way around the pit, making the quarry part of a vast sea.

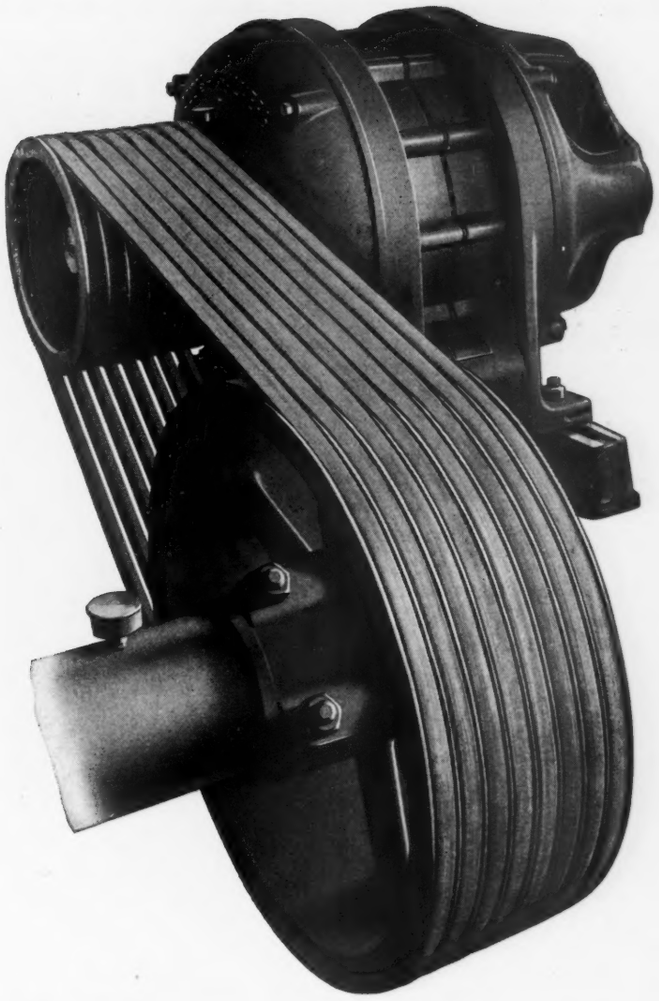
There was warning enough to get any valuable machinery out of the pit that might have been damaged by water.

After the creek had receded, big holes were blasted in the dike to permit the water to run out as much as possible. The remainder will be pumped out.

The flood means a delay of probably two weeks or more in starting the quarry. The Concrete Materials Corp. of Waterloo, Iowa, new owners of the place, had planned to begin taking out rock the first week in August. Much of the preliminary work now must be done over. It will require about a week to pump the pit dry.

TEXROPE DRIVES

Provide Efficient and Dependable Means for Transmitting Power



Where the loads are heavy and the going rough, the flexibility of the Texrope Drive is of great importance. It acts as a cushion between the driver and the driven machine, protecting both. The driven unit receives the power in a smooth, even stream, rather than a series of jerks, and the driver is not subjected to the punishment that it would take with other types of drives.

Texropes operate on extremely short centers, saving construction and housing expense. They are positive, the belts cannot slip; the greater the load the deeper they pull into the grooves and the less chance for slippage. The multiplicity of belts lessens the chance of breakdown. The Texrope Drive is

"The Flexible and Positive Multiple Belt Drive for Close Centers"

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Incorporations

Oakwood Gravel Co., Dayton, Ohio, $25,000. Clark J. Bell, Paul A. Nill and Isaiah H. Bell.

East Texas Gravel Co., Dallas, Texas, $30,000. Tom L. Tipton, Dan Harston, J. B. Dunaway, Jr.

Idaho Portland Cement Co., Boise, Idaho, $500,000. H. R. Turner, Pocatello, Idaho; A. J. Lindsay, Spokane, Wash.

South Carolina Granite Corp., Wilmington, Del., 100,000 shares, common. Corporation Trust Co. of America, Wilmington.

Comache Sand and Gravel Co., Wilmington, Del., 1000 shares, common. Corporation Trust Co. of America, Wilmington.

Southern Lime Products Co., Wilmington, Del., 3000 shares common. Corporation Trust Co. of America, Wilmington.

Sunbeam Quarries Co., Bardstown, Ky. T. J. Beam, Bardstown, Ky. To operate crushed-stone quarries in Bullitt county, Kentucky.

Baldwin Sand and Gravel Co., Elmira, N. Y., $15,000 preferred, 450 shares common. Correspondents, Mandeville and Personius, Elmira, N. Y.

Harry S. Hart, Inc., New York City, $10,000. Correspondent, W. C. Daly, 217 Broadway, New York City. To manufacture concrete products.

Nel-Stone Co., 308 Jefferson Bldg., Peoria, Ill., $50,000. E. V. Champion, C. H. Tapping and H. B. Reed. Manufacture and deal in concrete buliding units.

Sunshine Quarries, Inc., Springfield, Mo., $25,000. W. J. Johnston, S. C. Conway, H. B. Johnston and M. F. Conway. To operate quarries in Greene county.

Saxton and Dickinson, Inc., Goshen, N. Y., $10,000. Claude H. Saxton, Olive R. Saxton, Louis B. Dickinson (56 Roosevelt Ave., Middleton, N. Y.). To produce sand and gravel.

Insulcrete Co., 1335 South Circle Ave., Forest Park, Ill., $3150 common, $12,350 preferred. George L. Oswalt, Bert Carey and Peter Euwema. To manufacture and sell concrete products.

Clay and Stone Manufacturing Co., 20th Street Station, 20th street, Rock Island, Ill.; $75,000 preferred and $75,000 common. Victor K. Dross, Mortz Schiele, E. McCraney, William Paulsen, Henry H. Abel, Franklin S. Keller, E. G. Flattlet, E. G. Appleton, W. B. Judge. Correspondent: F. A. Harrison, 304 Kahl building, Davenport, Iowa. To manufacture clay and stone products of every kind and description, etc.

Quarries

Hauser Construction Co., Marshfield, Ore., has had an oil painting made of its Coos river quarry by P. J. Rennings. The picture is 30x40 in. and shows the rock being taken from the quarry and loaded on government barges to be taken to the jetty at Charleston. This is the first picture of a series which Mr. Rennings plans to paint. His second picture will be of the jetty.

Sand and Gravel

Neal Gravel Co., Cayuga, Ind., recently began working night shifts to fill orders.

Augusta Sand and Gravel Co., Hamburg, Ga., has recently installed new equipment to give sand several additional washings before loading.

Washington County Sand and Gravel Co., Hanover, Kan., has electrified its operation, purchasing power from the Kansas Power and Light Co.

Beaver Brook Sand and Gravel Co., Waltham, Mass.—Thieves who used a sledge hammer to break the combination knob robbed the safe in the office of the company. They took $15.

Scott County Board of Supervisors, Davenport, Iowa, has approved the recommendation of County Engineer J. M. Malloy for the purchase of a tract of gravel land, north of Princeton.

Ohio River Sand and Gravel Co., Parkersburg, W. Va., has placed an order with the Dravo Contracting Co., Pittsburgh, Penn., for four 100x26x6½-ft. steel sand and gravel barges, deck type with cargo box.

Champion Sand and Gravel Co., Loretto, Mich., has been sold to a new organization headed by M. J. Bacco, an Iron Mountain (Mich.) highway contractor. The company has plants at Champion and Loretto and has been doing a successful business for a number of years.

Adams Bros., Zanesville, Ohio, a contracting firm, have opened a washed sand and gravel plant on the Warsaw road, about one mile west of Roscoe. The company has operated the plant for some time for its own use, but is now placing its sand and gravel on the market. U. F. Fattler is in charge.

American Aggregates Corp. Greenville, Ohio, set a new loading record July 9, at its Logansport, Ind., plant. During the 16 hours the plant was in operation, a total of 149 cars, 104 of the hopper type and 45 of the gondola style, were loaded. This is an average of nine cars per hour, or one car every six minutes and 36 seconds.

Halleck Sand and Gravel Co. Chillicothe, Ohio—"Playing the part of the good Samaritan is not all it's cracked up to be, Ed Davis, manager, was ready to admit early today after a 'buddy' of a colored man he befriended, had robbed him of $3, a suit of clothes, razor and some ties and collars. A negro who said his name was John Williams, appeared at the gravel plant Sunday afternoon and asked for work. He was ragged and dirty. Mr. Davis had no work for him but took pity on him, gave him a pair of trousers, a suit of underwear, and a pair of sox and had him take a bath in the pool nearby. Then he told him he could sleep in an outbuilding nearby. Mr. Davis who has quarters in the company office was awakened about 3 a.m. Monday by a prowler. 'Is that you, John?' he inquired, thinking it was the negro he befriended. 'No,' came the response through the darkness. 'But I'm John's buddy. Give us your money or we'll cut your throat.' Mr. Davis gave up $3 in change."

Cement

Atlas Portland Cement Co., Independence, Kan., opened its plant recently for an inspection by boy scouts. A supper and swim were added attractions.

West Penn Cement Co., West Winfield, Penn., is installing a three-compartment compeb mill (Allis-Chalmers Manufacturing Co.) of the largest size yet made. The shipping weight of this one unit is 109,100 lb. and the mill complete with foundation will weigh about 525,000 lb. The capacity is about 50 tons of cement hourly. The cost of the mill installed will be approximately $300,000.

Lawrence Portland Cement Co., Thomaston, Me.—Another building will be added to the plant with the erection of a storage house, 30x100 ft. This is to be used exclusively for the storage of brick linings for the kilns and coolers. A smaller structure is soon to go up wherein storage for two carloads of dynamite will be available. Added to these will be three buildings, now being remodeled. These are the commissary buildings which are to be coated with gunnite and divided to take care of 50 automobiles, the private machines of the mill employes. Work on clearing up the grounds about the big plant is being carried along rapidly and by the middle of next month they will be free of debris from the construction work, as well as from equipment used in the building of the mill.

Oregon Portland Cement Co., Portland, Ore.—General contract for the erection of the three-story warehouse and office building at East First and Madison streets was let to the Hansen-Hammond Co. An early start on construction is expected. Two floors of the building plans for which were drawn by L. L. Dougan, architect, will be used for warehouse purposes, as will the basement. The third floor will be given over to offices, the company planning to move its offices from their present location in the Wilcox building. Finish of the building will be in concrete. Special pains were taken in the designing of the structure, Mr. Dougan, the architect, being commissioned to attain the highest type of beauty possible in a warehouse building that the structure might stand as an example of what may be done in concrete construction.

Lime

Standard Lime and Plaster Co., Grants Pass, Ore., is contemplating starting operation soon, with the installation of new machinery.

Kennedy Refractories Co., Bettsville, Ohio, according to local news dispatches, is contemplating building a lime plant. Bettsville was at one time a lime-manufacturing center.

Glencoe Lime and Cement Co., St. Louis, Mo., is left without passenger train service to its Glencoe plant, St. Louis county, Missouri, by the withdrawal of service on the Frisco railroad. Petitions have been filed with the state public service commission to have the service restored.

Gypsum

Gypsum Products Corp., Seattle, Wash., manufacturers of "Schumacher" and "Perfection" brands of gypsum wall-board, has appointed J. F. Barnes factory representative at Portland, Ore.

United States Gypsum Co., Chicago, Ill., has moved its district office from Chicago to Pittsburgh, Penn., where L. S. Good is district sales manager. The company has also established district offices at Detroit, Mich., where a new plant is now under construction.

Slate

Diamond Slate Co., West Pen Argyl, Penn., is installing a new boiler plant.

Personals

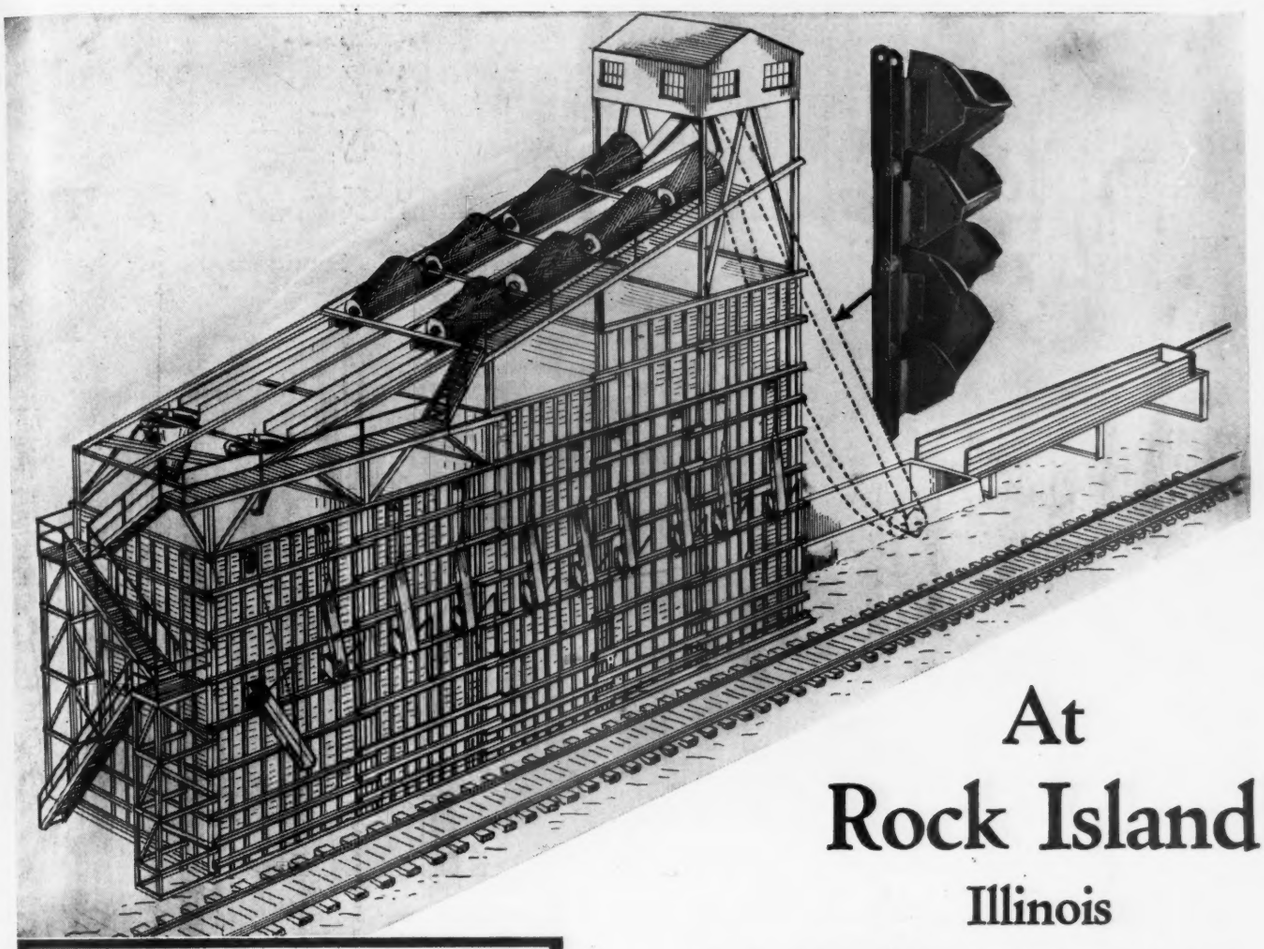
John Denton, formerly with the M. E. Gooding Lumber Co., Durant, Okla., is now city salesman for the Ash Grove Lime and Portland Cement Co., of Kansas City, Mo., in Oklahoma City, Okla.

Dewey Fullington of Kansas City, Mo., who represents the Lehigh Portland Cement Co., was in Clay Center, Kan., recently to attend a dinner and informal meeting of the lumbermen of Clay county and surrounding territory at the Bonham hotel. A dozen or fifteen gentlemen enjoyed the dinner and were intensely interested in Mr. Fullington's illustrated lecture on "Modern Trade Methods." He is sent out by the Lehigh company to deliver this lecture at various places. Among those from out of town in attendance at the gathering were Bert Pinder of Clifton, Everett Kerby of Wakefield, Mr. Wilson of Oak Hill, Mr. Henry of Morganville, Scott Fullington of Idana.

Manufacturers

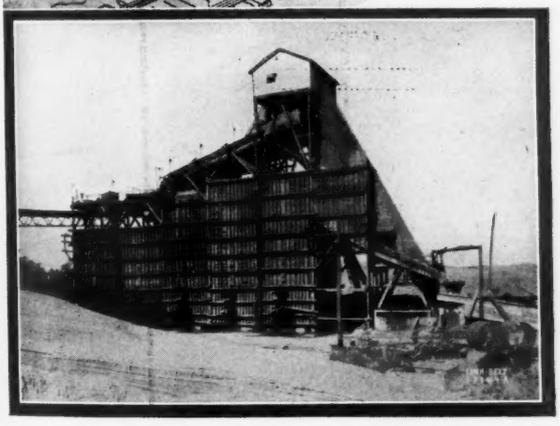
Stone & Webster Engineering Corp. Boston, Mass., has been formed with capital of $9,500,000 and has acquired from the North American Co. its engineering and construction company, known as McClellan and Junkersfeld, Inc. The new company also has taken over from Stone & Webster, Inc., its construction and engineering business and its interest in Ulen & Co. McClellan and Junkersfeld, Inc., are known in the portland cement industry in connection with waste-heat power installations.

H. K. Ferguson Co., Hanna Bldg., Cleveland, Ohio—R. E. J. Summers, chief contracting engineer, has been made a vice-president in charge of contract work. Mr. Summers has been with the Ferguson company since 1919, holding the positions of assistant chief engineer, chief engineer and chief contracting engineer. He has spent much time in Japan for the company. During the war he served as captain of engineers with the A. E. F. He was graduated in 1914 from the civil engineering college of Cornell University.



At Rock Island Illinois

Rock Island Sand & Gravel Co.



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